RCS10
M:N Redundant Communication System

Installation and Operation Manual

TM058 - Rev. 2.3

April, 2000

- NOTICE -

RADYNE COMSTREAM

Radyne ComStream Corporation • 3138 E. Elwood St. • Phoenix, AZ 85034 • (602) 437-9620 • Fax: (602) 437-4811

RADYNE COMSTREAM WARRANTY POLICY

Warranty and Service

Radyne ComStream (hereafter referred to as Radyne or Seller) warrants the items manufactured and sold by Radyne ComStream to be free of defects in material and workmanship for a period of two (2) years from date of shipment. Radyne ComStream's obligation under its warranty is limited in accordance with the periods of time and all other conditions stated in all provisions of this warranty.

This warranty applies only to defects in material and workmanship in products manufactured by Radyne ComStream. Radyne ComStream makes no warranty whatsoever concerning products or accessories not of its manufacture.

Repair, or at Radyne ComStream's option, replacement of the Radyne ComStream products or defective parts therein shall be the sole and exclusive remedy for all valid warranty claims.

Warranty Period

The applicable warranty period shall commence on the date of shipment from Radyne ComStream's facility to the original purchaser and extend for the stated period following the date of shipment. Upon beginning of the applicable Radyne ComStream warranty period, all customer's remedies shall be governed by the terms stated or referenced in this warranty. In-warranty repaired or replacement products or parts are warranted only for the remaining unexpired portion of the original warranty period applicable to the repaired or replaced products or parts. Repair or replacement of products or parts under warranty does not extend the original warranty period.

Warranty Coverage Limitations

The following are expressly **not covered** under warranty:

1. Any loss, damage and/or malfunction relating in any way to shipping, storage, accident, abuse, alteration, misuse, neglect, failure to use products under normal operating conditions, failure to use products according to any operating instructions provided by Radyne ComStream, lack of routine care and maintenance as indicated in any operating maintenance instructions, or failure to use or take any proper precautions under the circumstances.

2. Products, items, parts, accessories, subassemblies, or components which are expendable in normal use or are of limited life, such as but not limited to, bulbs, fuses, lamps, glassware, etc. Radyne ComStream reserves the right to revise the foregoing list of what is covered under this warranty.

Warranty Replacement and Adjustment

Radyne ComStream will not make warranty adjustments for failures of products or parts which occur after the specified maximum adjustment period. Unless otherwise agreed, failure shall be deemed to have occurred no more than seven (7) working days before the first date on which a notice of failure is received by Radyne ComStream. Under no circumstances shall any warranty exceed the period stated above unless expressly agreed to in writing by Radyne ComStream.

Liability Limitations

This warranty is expressly in lieu of and excludes all other express and implied warranties, including but not limited to warranties of merchantability and of fitness for particular purpose, use, or applications, and all other obligations or liabilities on the part of Radyne ComStream, unless such other warranties, obligations, or liabilities are expressly agreed to in writing by Radyne ComStream.

All obligations of Radyne ComStream under this warranty shall cease in the event its products or parts thereof have been subjected to accident, abuse, alteration, misuse or neglect, or which have not been operated and maintained in accordance with proper operating instructions.

In no event shall Radyne ComStream be liable for incidental, consequential, special or resulting loss or damage of any kind howsoever caused. Radyne ComStream's liability for damages shall not exceed the payment, if any, received by Radyne ComStream for the unit or product or service furnished or to be furnished, as the case may be, which is the subject of claim or dispute.

Statements made by any person, including representatives of Radyne ComStream, which are inconsistent or in conflict with the terms of this warranty, shall not be binding upon Radyne ComStream unless reduced to writing and approved by an officer of Radyne ComStream.

Warranty Repair Return Procedure

Before a warranty repair can be accomplished, a Repair Authorization must be received. It is at this time that Radyne ComStream will authorize the product or part to be returned to the Radyne ComStream facility or if field repair will be accomplished. The Repair Authorization may be requested in writing or by calling:

Radyne ComStream Corporation

3138 E. Elwood St.

Phoenix, Arizona 85034 (USA)

ATTN.: Customer Support

Phone: (602) 437-9620 Fax: (602) 437-4811

Any product returned to Radyne ComStream for examination must be sent prepaid via the means of transportation indicated as acceptable to Radyne ComStream. Return Authorization Number must be clearly marked on the shipping label. Returned products or parts should be carefully packaged in the original container, if possible, and unless otherwise indicated, shipped to the above address.

Non-Warranty Repair Procedure

When a product is returned for any reason, Customer and its shipping agency shall be responsible for all damage resulting from improper packing and handling, and for loss in transit, not withstanding any defect or nonconformity in the product. By returning a product, the owner grants Radyne ComStream permission to open and disassemble the product as required for evaluation. In all cases, Radyne ComStream has sole responsibility for determining the cause and nature of failure, and Radyne ComStream's determination with regard thereto shall be final.

RCS10 Redundant Communication System

Installation and Operation Manual

TM058 - Record of Revisions

Radyne ComStream Corporation is constantly improving its products and therefore the information in this document is subject to change without prior notice. Radyne ComStream Corporation makes no warranty of any kind with regard to this material, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. No responsibility for any errors or omissions that may pertain to the material herein is assumed. Radyne ComStream Corporation makes no commitment to update nor to keep current the information contained in this document. Radyne ComStream Corporation assumes no responsibility for use of any circuitry other than the circuitry employed in Radyne ComStream Corporation's systems and equipment.

Revision Level	Date	Reason for Change
1.0	2-28-97	Initial Release
1.1	4-15-97	Added menu screens, updated serial communications protocol, enhanced Operation section, added DIP Switch Configuration
2.0	3-1-98	Added TUV CE warning data and Reed-Solomon Data
2.1	1-11-99	Added J10 Async Connector Table 2-10, Updated, reformatted and annotated operation Screens, added Ethernet information
2.2	7-21-99	Deleted Hayes Modem Info., Updated Alarms Operation Screens, Updated Remote Specs., updated User MIB
2.3	4-07-00	Added 'Learn Mode' feature information, Baseband Framing/Multiplexing and updated RCS10/DMD10 Remote Specs, added SNMP control data. Added addendum 7-22-03.

Addendum

3.4.1 Description

(Paragraph 3) Delete the following sentence:

Modems not part of a backup pool will not be learned.

3.4.6 Configuration Copy

The Configuration Copy is a feature that enables a user to store/retrieve up to five modem and interface card configurations in non-volatile memory. These are in addition to the current running configuration.

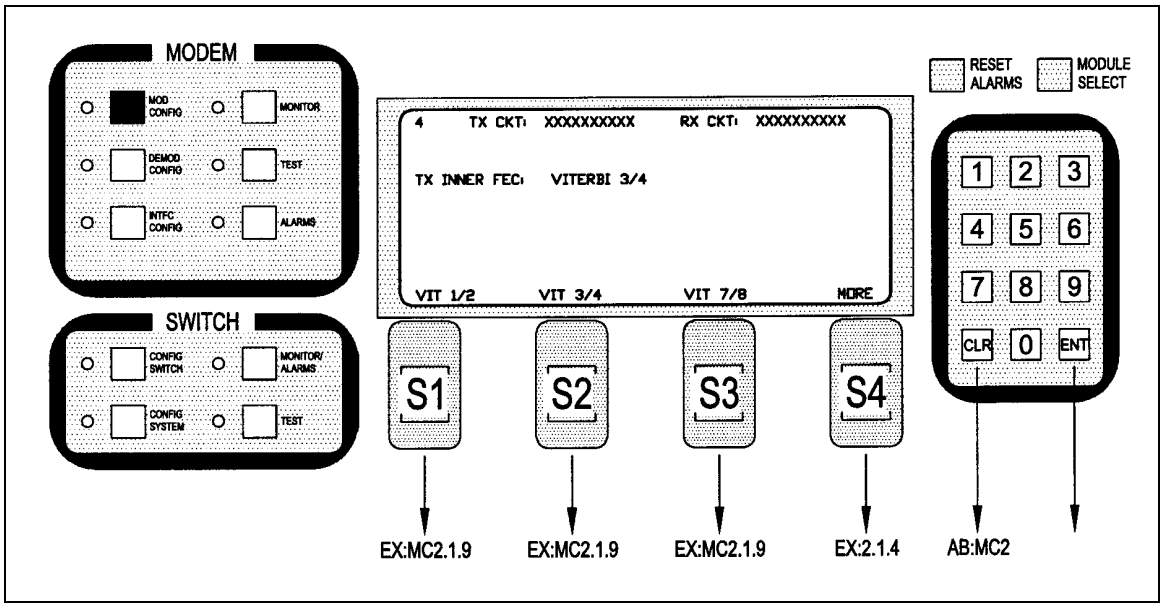
The interface card configurations are tagged to the slot, and are stored in the switch. The modems, on the other hand hold their own settings. The user can copy from and copy to any configuration in memory including the current running configuration. Source and destination configurations must be different.

When instructed to copy a configuration, the switch sends a command to the modem to copy the configuration, and if successful, the switch updates the slot configurations as well. If the destination configuration is the current configuration, the modem re-initializes itself and uses the new settings. The switch interface card is only updated when the destination configuration is the current configuration.

A user must be careful not to copy onto the current configuration unless that is desired, interruptions in traffic will occur.

3.9.1 Function Keys

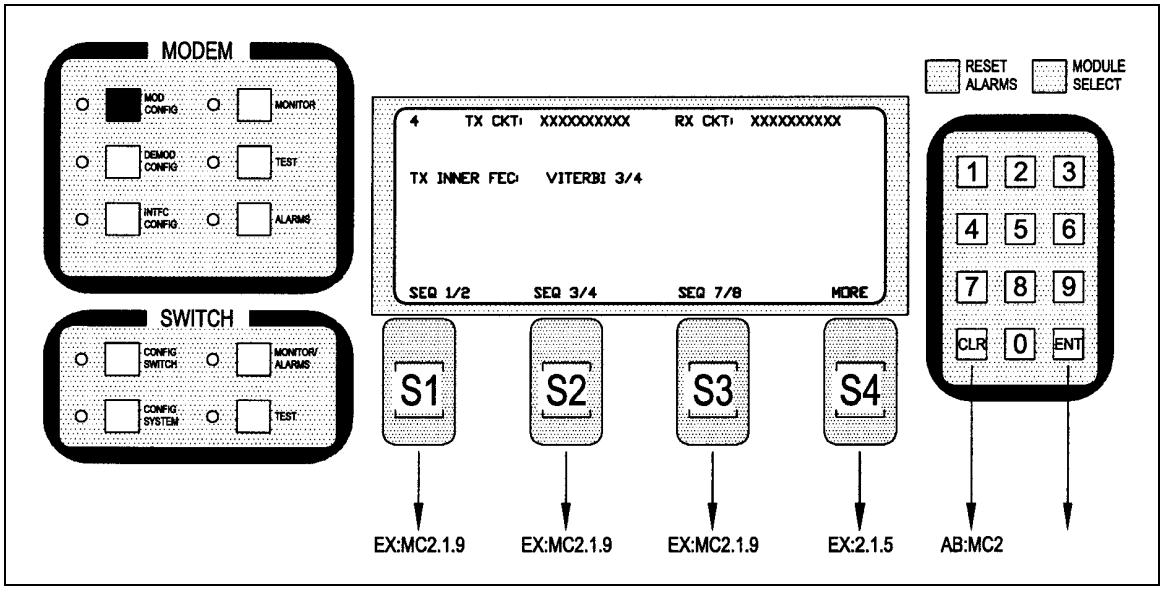
MC2.1 - Modified as follows:



Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode
TPC = Turbo Codec

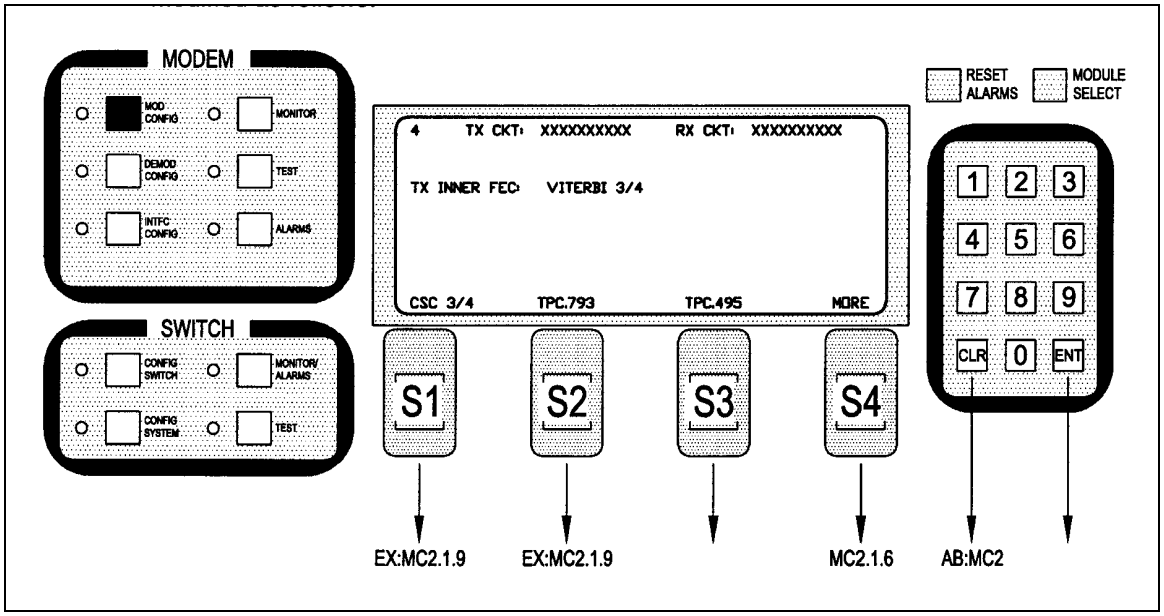
MC2.1.4 - Modified as follows:



Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode
TPC = Turbo Codec

MC2.1.5 – Modified as follows:

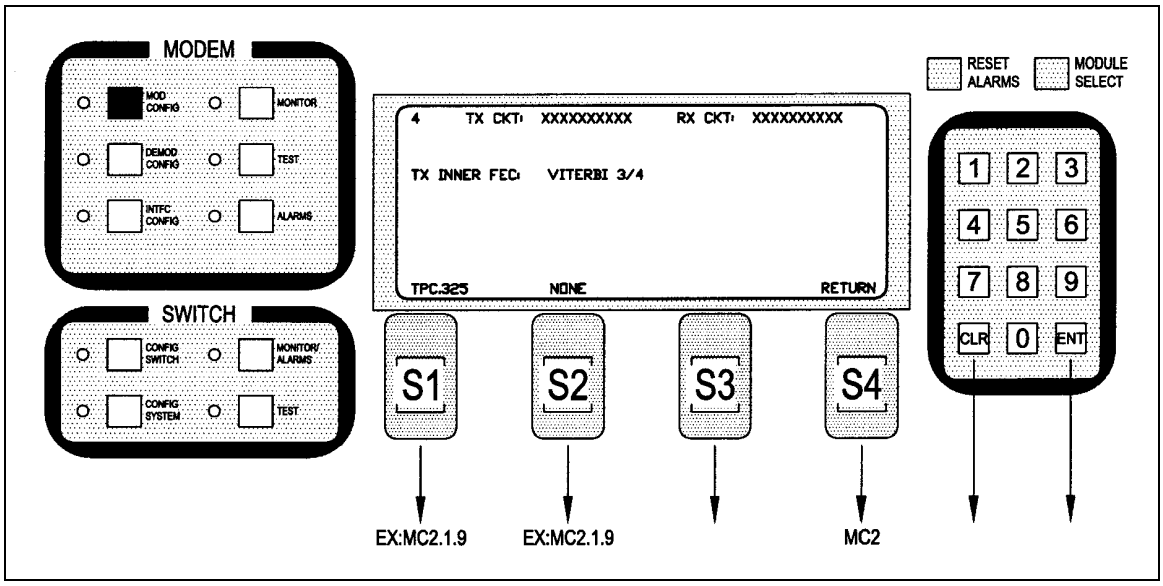


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

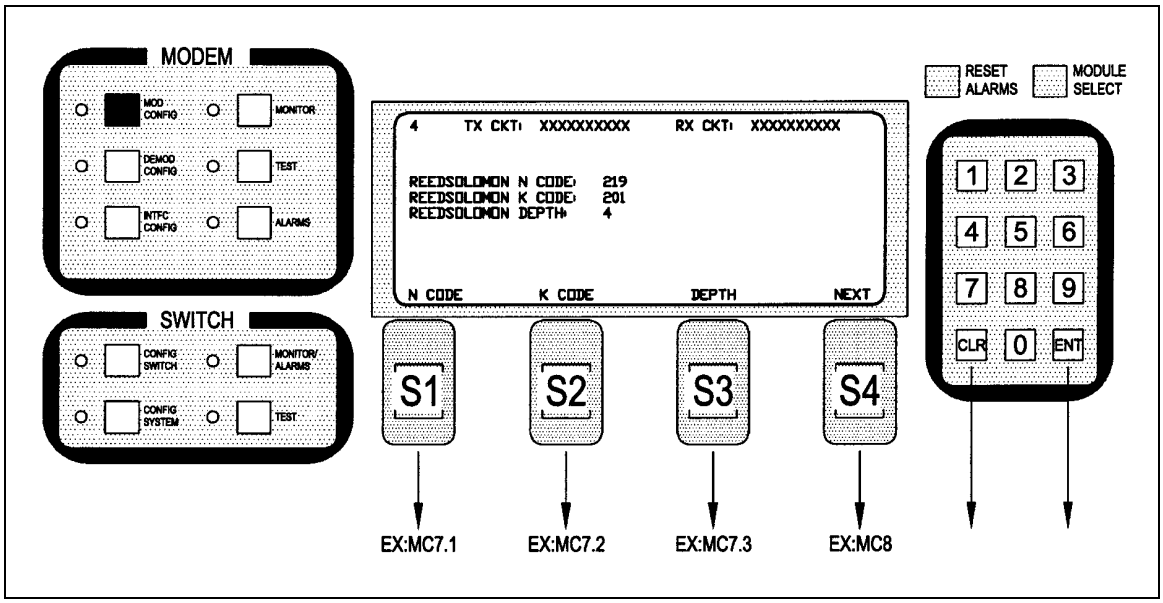
MC2.1.6– Added after Screen MC2.1.5 as follows:



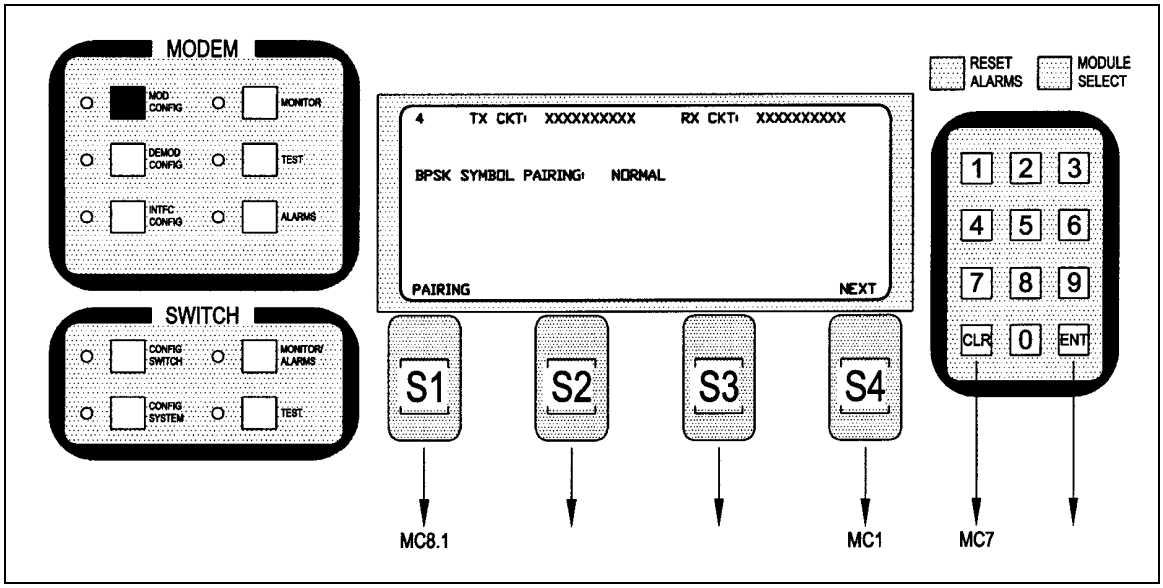
Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode
TPC = Turbo Codec

MC7 – Modified as follows:

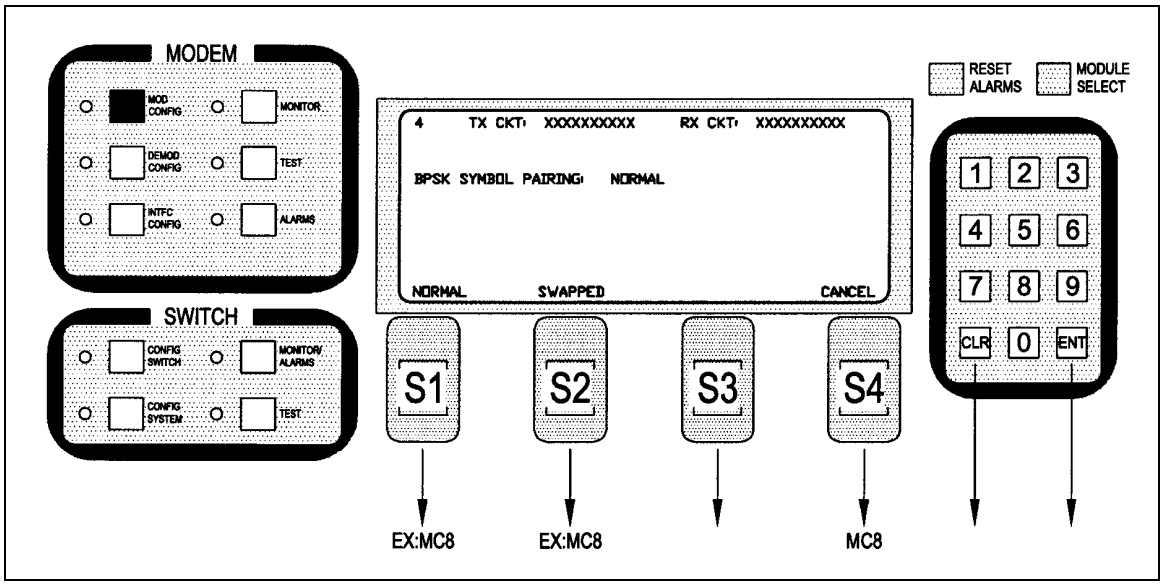


MC8 – Added after Screen MC7.3 as follows:



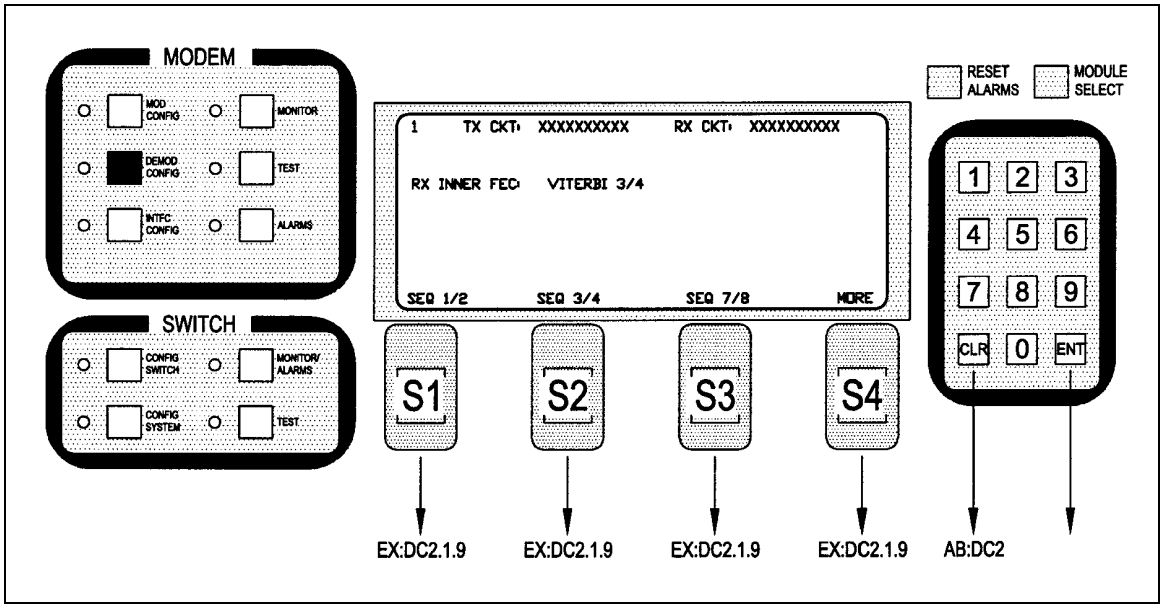
Note: BPSK Symbol Pairing Selection will only be displayed if BPSK Modulation is selected.

MC8.1 – Added after Screen MC8 as follows:



Note: BPSK Symbol Pairing Selection will only be displayed if BPSK Modulation is selected.

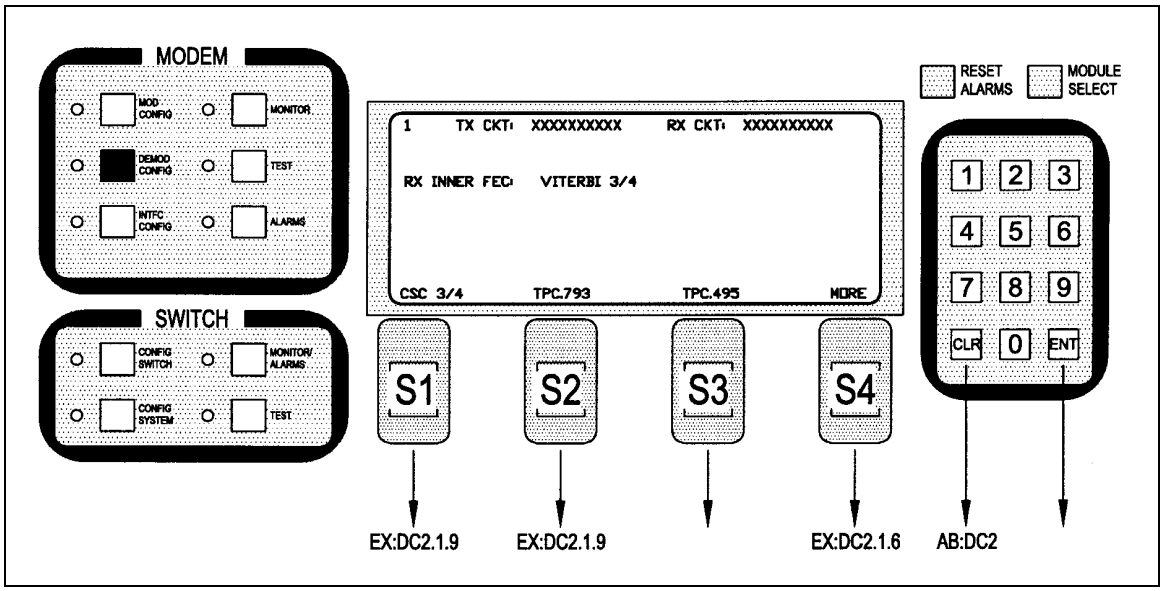
DC2.1.4 – Modified as follows:



Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode
TPC = Turbo Codec

DC2.1.5 – Modified as follows:

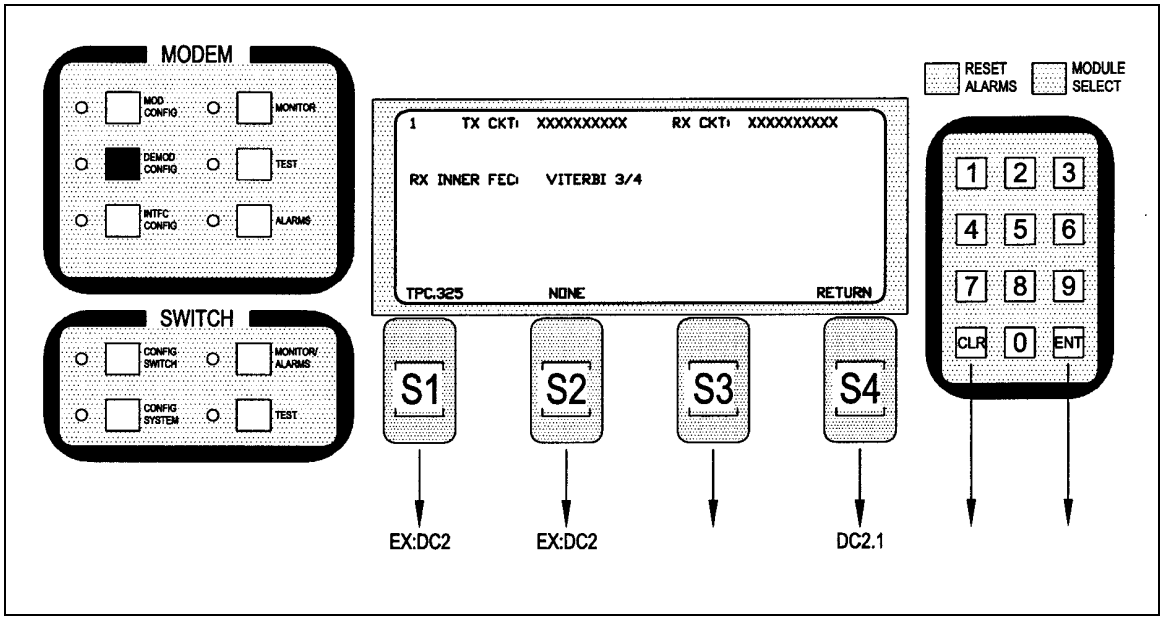


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793

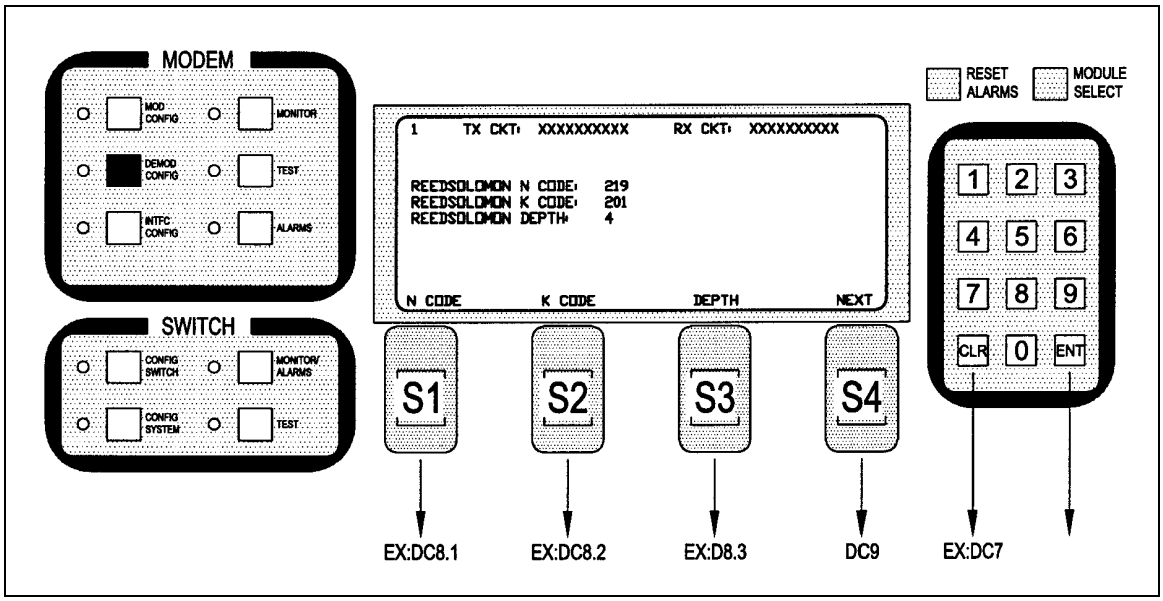
CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

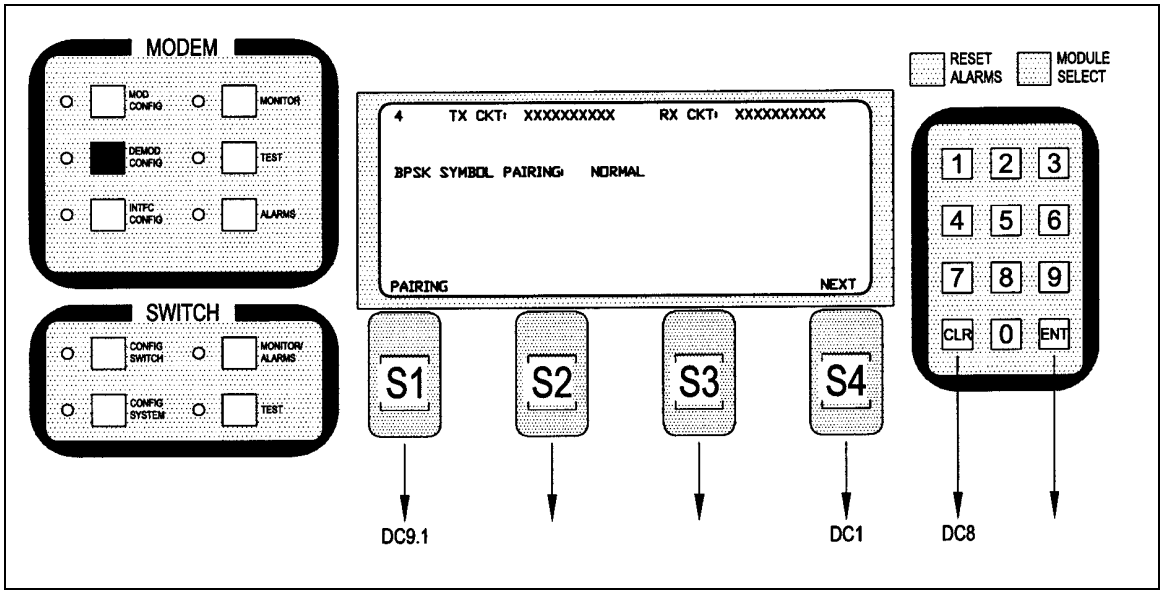
DC2.1.6 – Added after Screen DC2.1.5 as follows:



DC8 – Modified as follows:

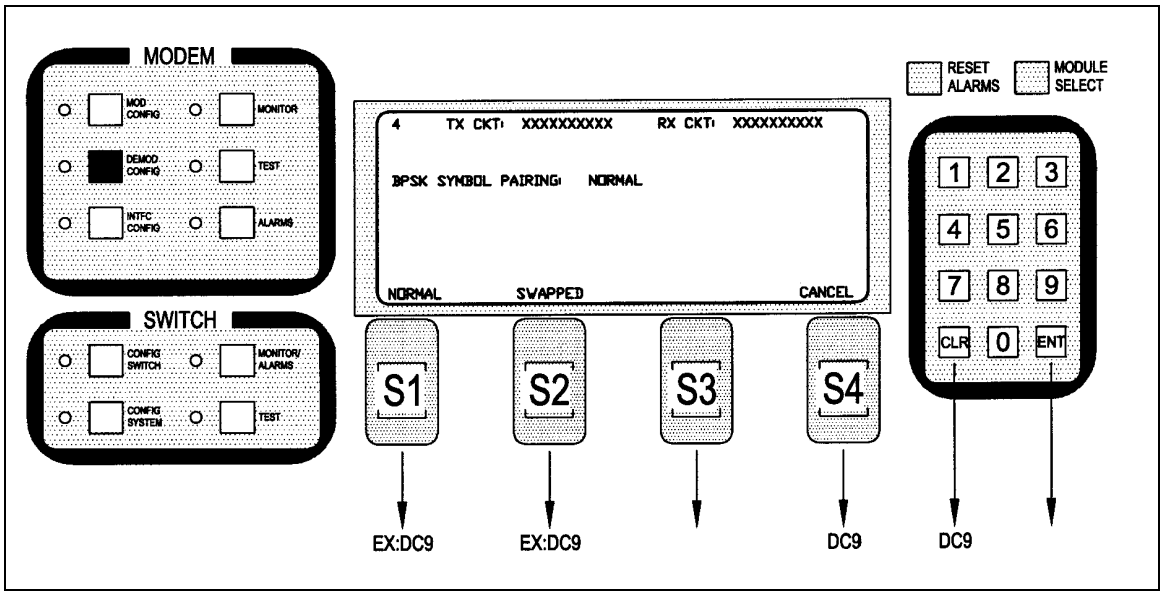


DC9 – Added after Screen DC8.3 as follows:



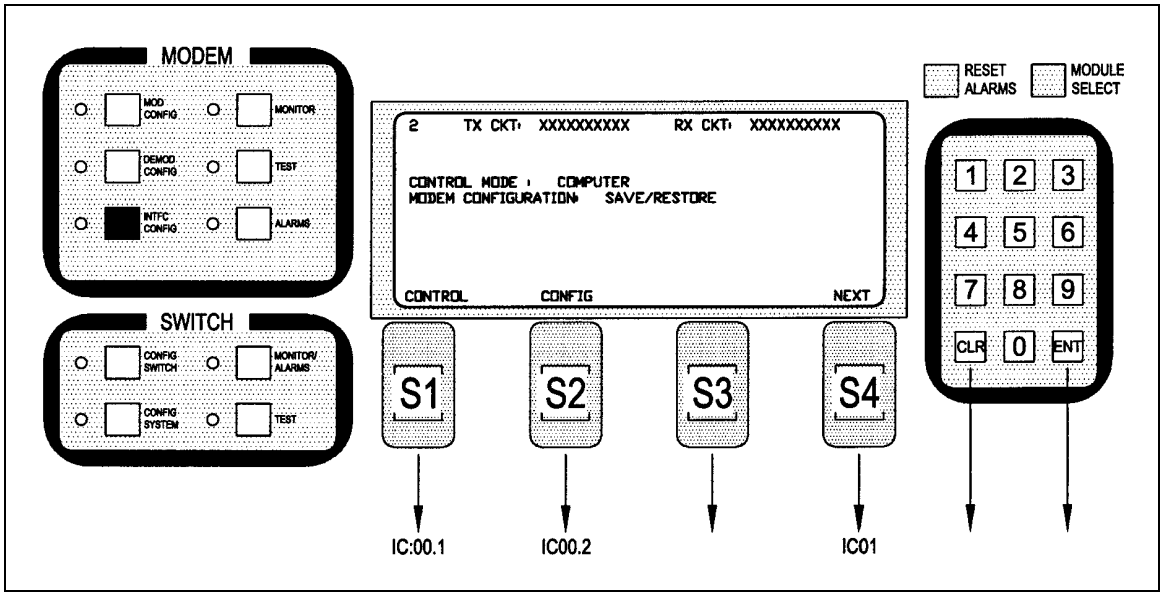
CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode
TPC = Turbo Codec

DC9.1 – Added after Screen DC9 as follows:



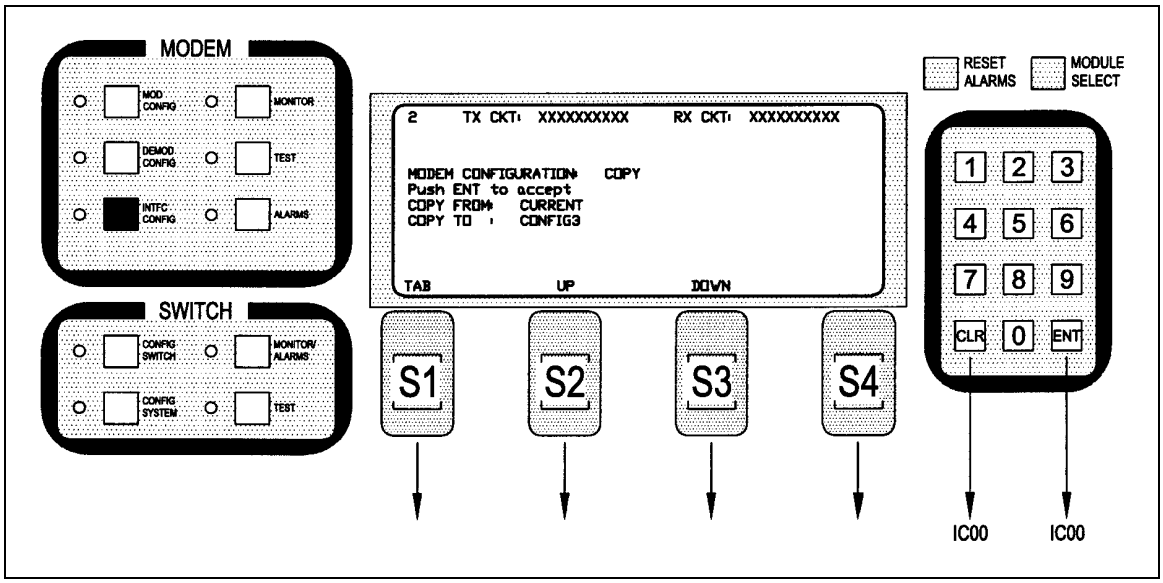
CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode
TPC = Turbo Codec

IC00 – Modified as follows:



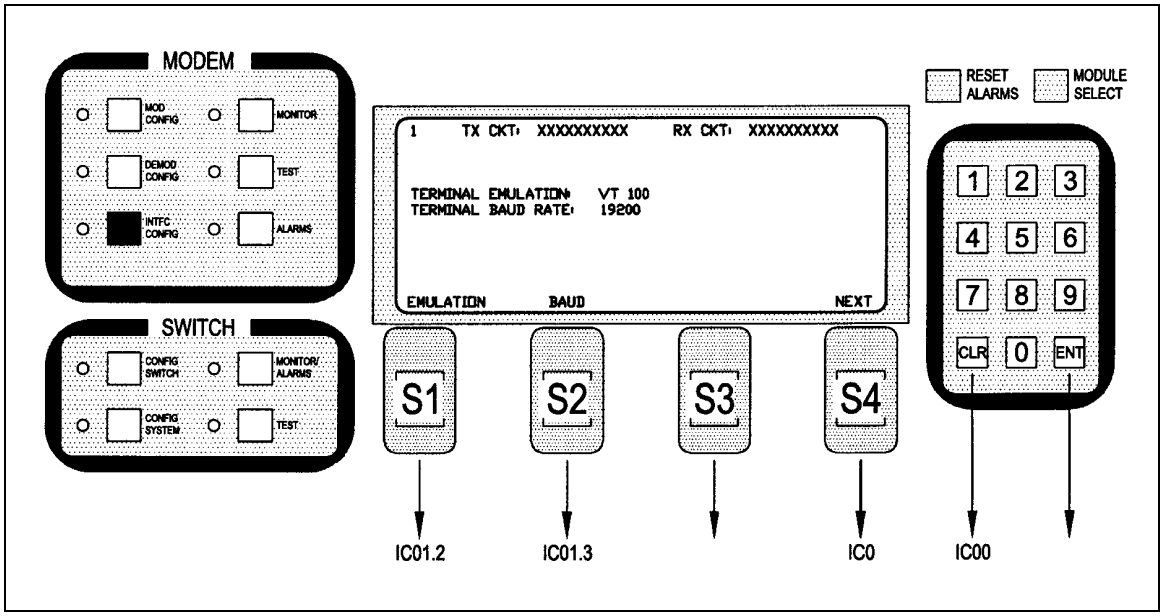
Note: Select Modem Control Mode or Configuration Copy Feature. Up to five configurations can be stored/retrieved.

IC00.2 – Added after Screen IC00.1 as follows:

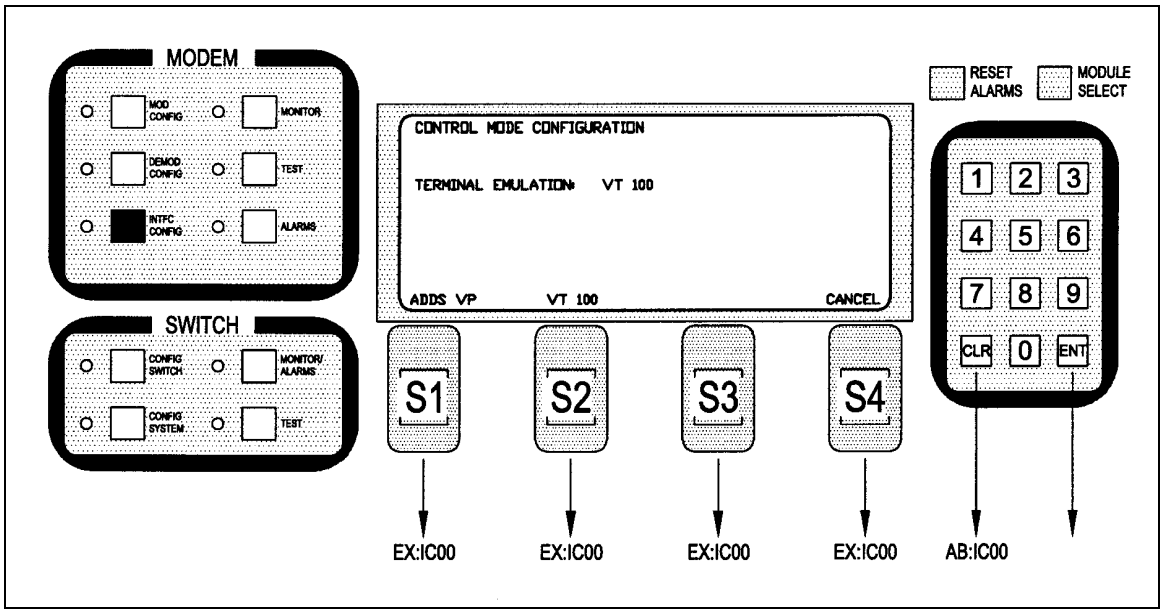


Note: Up to five configurations, in addition to the current settings, can be stored/retrieved.

IC01 – Added after Screen IC00.2 as follows:



IC00.2 – Changes its name to IC01.2 and is modified as follows:



IC00.3 – Changes its name to IC01.3.

IC00.4 – Changes its name to IC01.4.

IC00.5 – Changes its name to IC01.5.

B.1.4 Global Response Operational Codes

Change the last Modem Response Error Codes Description and Opcode of the first group to MPARM_AUPCDEFPOWER_ERROR 0x43F.

Add the following Modem Response Error Code Descriptions and Opcodes to the bottom of the first group (following MPARM_AUPCDEFPOWER_ERROR 0x43F):

MPARM_CONFIGURATIONSOURCE_ERROR	0x440
MPARM_CONFIGURATIONDESTINATION_ERROR	0x441
MPARM_CONFIGURATION_ERROR	0x442

B.2 Remote Port Packet Structure

Modulator Opcode <2400H>

Change <1> Convolutional Encoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Modulator Opcode <2607H>

Change <1> Convolutional Encoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Demodulator Opcode <2401H>

Change <2> Sweep Delay to:

(Binary value, 0.1 second steps. Reserved)

Change <1> Convolutional Decoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Change <1> Alarm 5 Masks to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Change Status Bytes <1> Alarm 5 to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Add to the end of Status Bytes:

<1> Spare
<4> Symbol Rate (Binary Value, 1bps steps)

Demodulator Opcode <240CH>

Change Status Bytes <1> Alarm 5 to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Add to the end of Status Bytes:

<1> Spare
<4> Symbol Rate (Binary Value, 1bps steps)

Demodulator Opcode <2409H>

Change <2> Sweep Delay to:

(Binary value, 0.1 second steps. Reserved)

Change <1> Convolutional Decoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Change <1> Alarm 5 Masks to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Demodulator Opcode <2A08H>

Change <1> Convolutional Decoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Add to the end of Demodulator Opcodes:

Opcode: <2C0BH> Command modem terminal emulation
<1> Emulation Mode (0 = Add viewpoint, 1 = VT 100, 2 = WYSE50)

Opcode: <2C0CH> Command modem terminal baud rate
<1> Baud Rate (0 = 300 baud, 1 = 600 baud, 2 = 1200 baud, 3 = 2400 baud, 4 = 800 baud, 5 = 9600 baud, 6 = 19200 baud, 7 = 38400 baud)

Opcode: <2C0DH> Command modem configuration copy
<1> Source Configuration (0 = current, 1 = configuration 1, 2 = configuration 2, 3 = configuration 3, 4 = configuration 4, 5 = configuration 5)

<1> Destination Configuration (0 = current, 1 = configuration 1, 2 = configuration 2, 3 = configuration 3, 4 = configuration 4, 5 = configuration 5)

Note: Source and destination configuration configurations must be different. Error 0x441 will be returned if they are the same.

Radyne Private MIB for RCS10

Add to the end of line:

RadRCS10_TxConvolutionalEncoder OBJECT-TYPE
SYNTAX Integer {
Comstream_seq_3_4(19)

,
tpc793_2D(20),
tpc495_3D(21),
tpc325_3D(22)

Add to the end of line:

DESCRIPTION
"Selects…

…for future use. Sequential, turbo codec, and trellis are installed options."

Delete from line:

RadRCS10_TxModulationType OBJECT-TYPE
DESCRIPTION
"Selects…

16QAM modulation is not yet implemented.

Add to the end of line:

RadRCS10_RxConvolutionalDecoder OBJECT-TYPE
SYNTAX Integer {
Comstream_seq_3_4(19)

,
tpc793_2D(20),
tpc495_3D(21),
tpc325_3D(22)

Add to the end of line:

DESCRIPTION
"Selects…

…for future use. Sequential, turbo codec, and trellis are installed options."

Replace the following line:

RadRCS10_RxAlarm5Mask OBJECT-TYPE
SYNTAX Integer…
Bit 1..7 = Spares

With:

Bit 1 = FMDSP Lock
Bit 2 = T1 signaling fault
Bit 3 = Turbo codec lock fault
Bits 4 – 7 = Spares

Insert after the following line:

RadRCS10_RxAlarm5Status OBJECT-TYPE
DESCRIPTION
Bit 0 = Trellis decoder lock

With:

Bit 1 = FMDSP Lock
Bit 2 = T1 signaling fault
Bit 3 = Turbo codec lock fault

Change the following line:

RadRCS10_RxAlarm5Status OBJECT-TYPE
DESCRIPTION
Bits 1 – 7 = Spares

To:

Bits 4 – 7 = Spares

Turning On/Off the Fairchild Compatible Scrambler/Descrambler

For the Mod

1. Go to the 'Mod Confg' Screen
2. Press the 'Next' Key 4 times.
3. 'Type' will appear. Press 'More' until you see 'V.35 (FC)'.
4. Press 'On' or 'Off' as applicable.

For the Demod

1. Go to the 'Demod Confg' Screen
2. Press the 'Next' Key 5 times.
3. 'Type' will appear. Press 'More' until you see 'V.35 (FC)'.
4. Press 'On' or 'Off' as applicable.

Swapping the Symbol for BPSK

For the Mod

1. Go to the 'Mod Confg' Screen
2. Press the 'Next' Key 7 times.
3. 'Pairing' will appear. Press 'Swapped' or 'Normal' as applicable.

For the Demod

1. Go to the ‘Demod Confg’ Screen
2. Press the ‘Next’ Key 8 times.
3. ‘Pairing’ will appear. Press ‘Swapped’ or ‘Normal’ as applicable.

Storing and Recalling 5 Configurations

1. From “Interface”, go to the ‘Confg’. The ‘Modem Configuration Copy’ Screen (Refer to Figure 1) will appear.

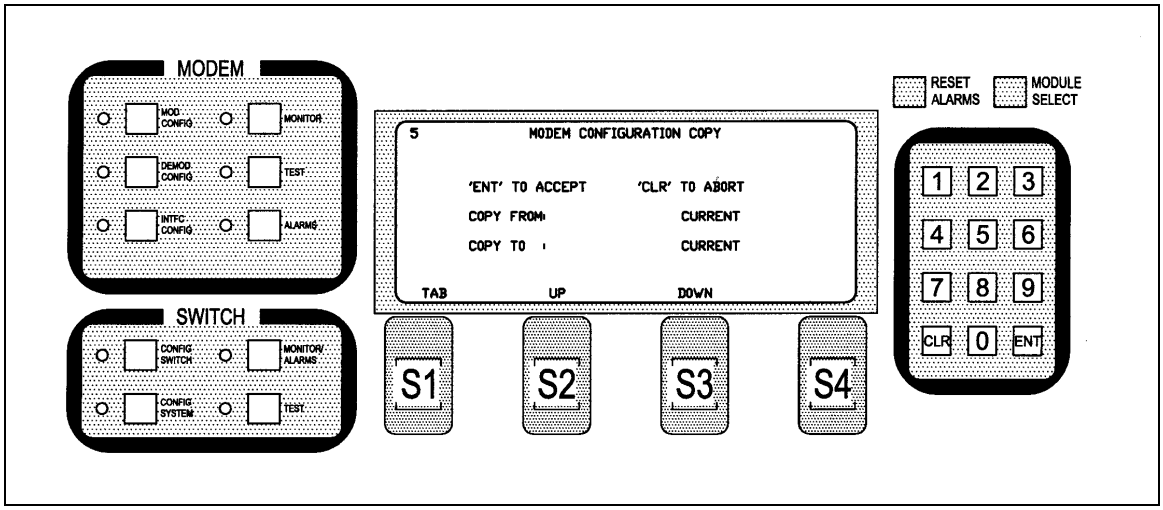


Figure 1.

2. Press the ‘Tab’ Button to select between ‘Copy from:’ and ‘Copy to:’.
3. Press the ‘Up’ or ’Down’ Buttons to select ‘Confg1‘ - ‘Confg5’ (the five configurations).

DMD10 I & Q Ports (Refer to Figures 2 and 3)

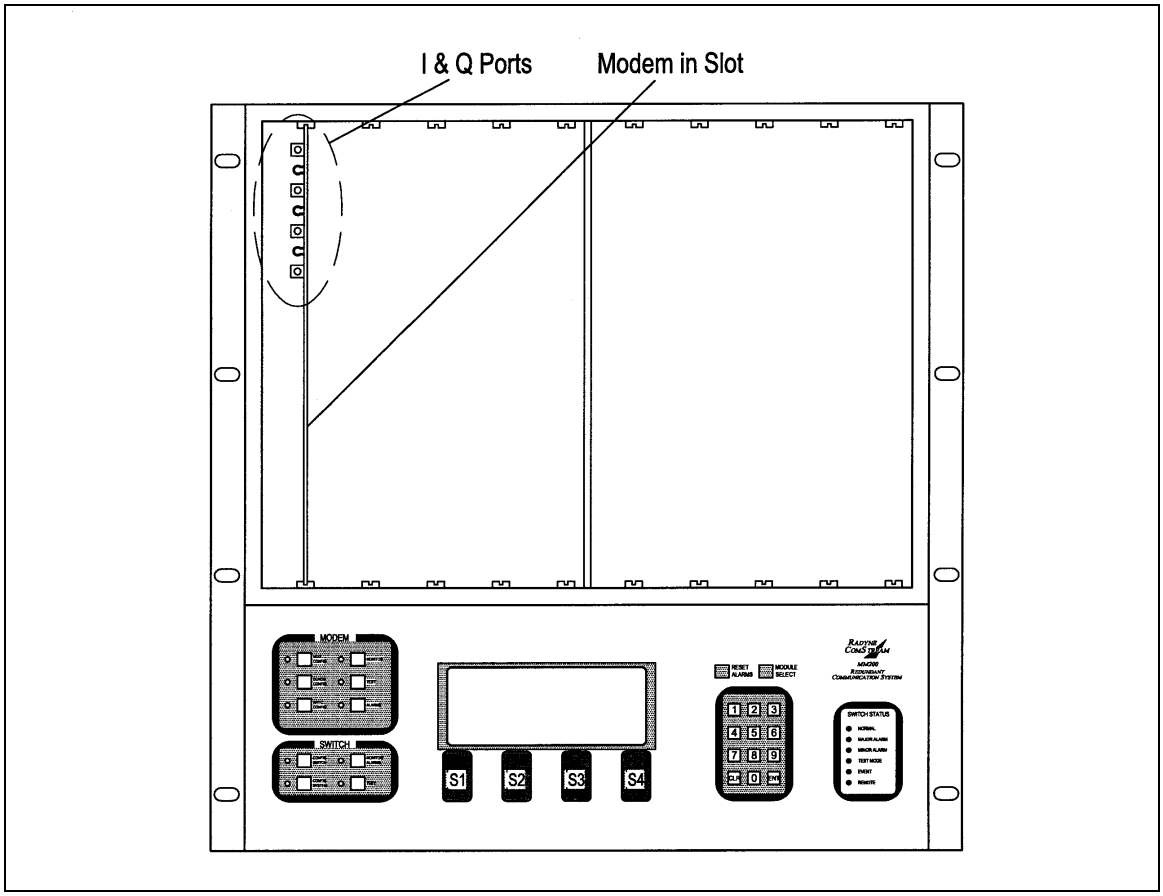


Figure 2.

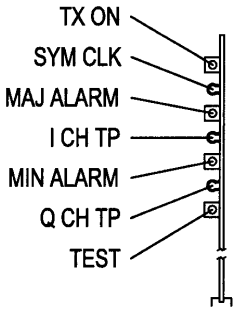


Figure 3.

Table of Contents

Section 1 - RCS10 Redundant Communication System Description

1.1 Introduction

As shown in Figure 1-1, Radyne ComStream's RCS10 is a complete, self-contained modem system with all modems, terrestrial interfaces and redundancy switch functions included in a single equipment cabinet that is 10 rack units high (17.5 inches). This compact and versatile common equipment package is unique and offers unsurpassed performance, reliability and flexibility. In addition to full support for Intelsat's IDR/IBS services, the system may be operated in closed networks.

The built-in M:N Redundancy Switch is an intelligent microcomputer controlled system, capable of controlling up to ten DMD10 modems in a variety of configurations.

The switch can be operated automatically, in which case an automatic back-up of a failed on-line modem occurs after a preprogrammed delay. The switch may also be operated manually, allowing the operator to manually switch in the backup unit. Front panel controls and indicators provide for auto/manual configuration, as well as display of online/off-line status information for all modems in the redundancy configuration.

RCS10 FEATURES

- Ten Modems and a Redundancy Switch in a 10 Rack Unit (17.5 inches) enclosure
- Up to 30 Modems in One Rack
- Large Display with Easy-to-use Menu Structure
- Built-in M:N Redundancy Switch
- Dual Redundant Power Supplies
- Fewer Cables Simplifies Installation
- Fully-Compliant with IESS 308/309
- Operation from 9.6 Kbps to 8.448 Mbps
- Options Include Drop and Insert, Reed-Solomon Codec, Sequential Decoder, Trellis Coded Modulation, ESC, OQPSK, 8PSK Modulation and Ethernet Remote M&C.

All switch and modem operating parameters, such as variable data rates and selectable IBS/IDR framing, are easily set and changed by the operator. The modem and redundancy switch monitor and control functions are available at the front panel of the system (Refer to Section 3). All functions may also be accessed through a terminal or a personal computer via a serial link (RS485 or Ethernet) for complete remote monitoring and control capability.

When used with the optional IFC10 IF Combiner/Splitter system, the RCS10 system provides all of the signal combiners and splitters, terminations and interconnecting cables that are necessary to connect any combination of up to nine active modems to nine independent uplink and nine independent downlink transponders. Refer to Figure 1-3, RCS10 System Block Diagram for a basic overview of the RCS10 system components.

1.2 External Reference

The External Reference Module, located in slot 10 on the far left side of the RCS10 rear panel (See Figure 1-2), has one External IF Reference input which is distributed to all ten DMD1O modems. Each modem's on-board system oscillator can be individually locked to the external reference.

Additionally, the external reference module can be equipped with a 10^{-7} high stability reference oscillator which is distributed to all ten DMD10 modems, thus providing a low-cost high-stability option. An External IF reference output is also provided for distribution to other equipment.

Also, the external reference has one BNC clock input which is distributed to all ten modems. Each modem control can independently select this external clock as its Tx clock and/or RX buffered clock source.

1.3 RCS10 System Functional Block Diagram

As shown in Figure 1-3, the RCS10 is comprised of five functional sections. Refer to Section 5, Principles of Operation, for detailed information on the DMD10 modem principles of operation. The functional areas of the RSC10 are as follows:

- IF Switch Section
- The DMD10 Modem Section
- The Data Switch Section
- The Switch CPU Section
- The Front Panel Interface

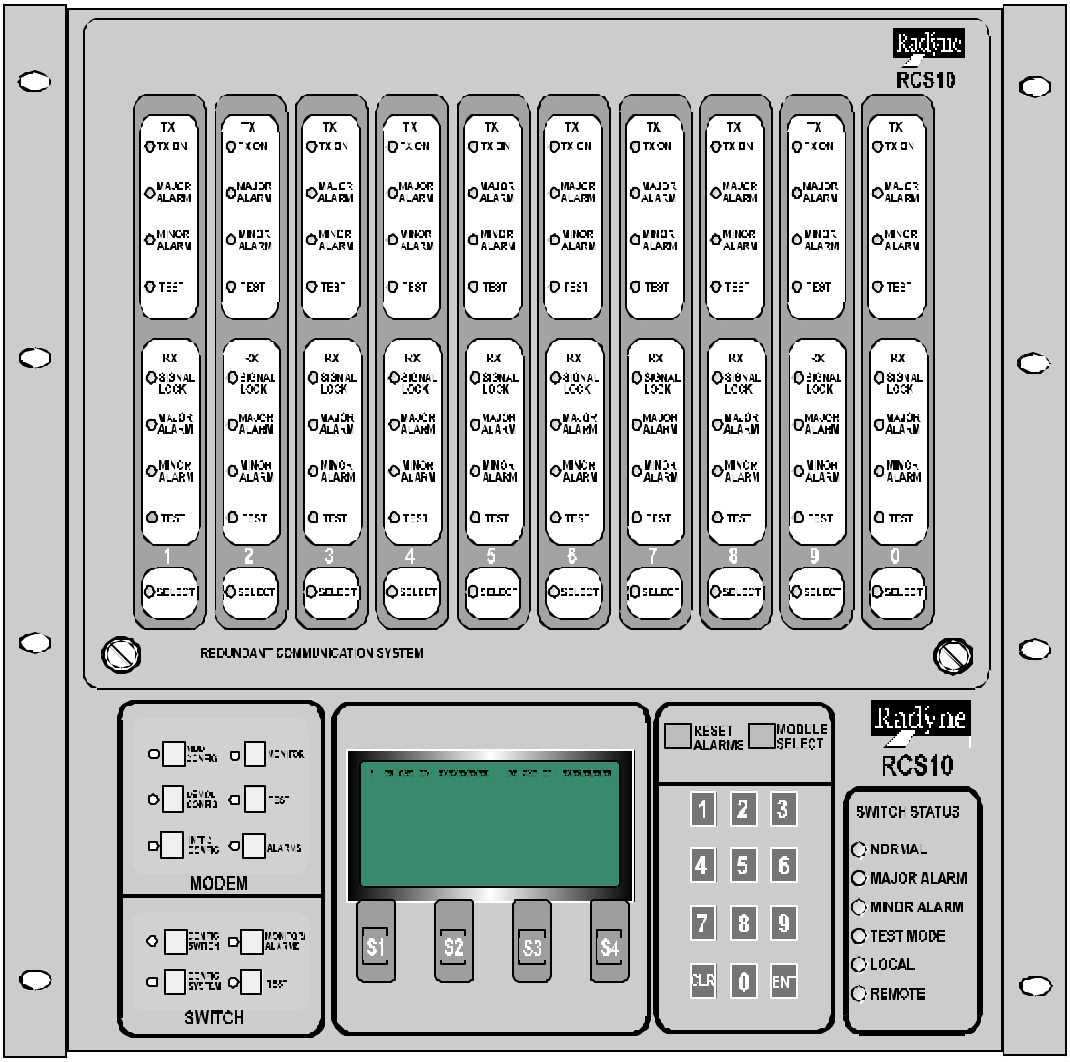


Figure 1-1. RCS10 Redundant Communication System Front Panel

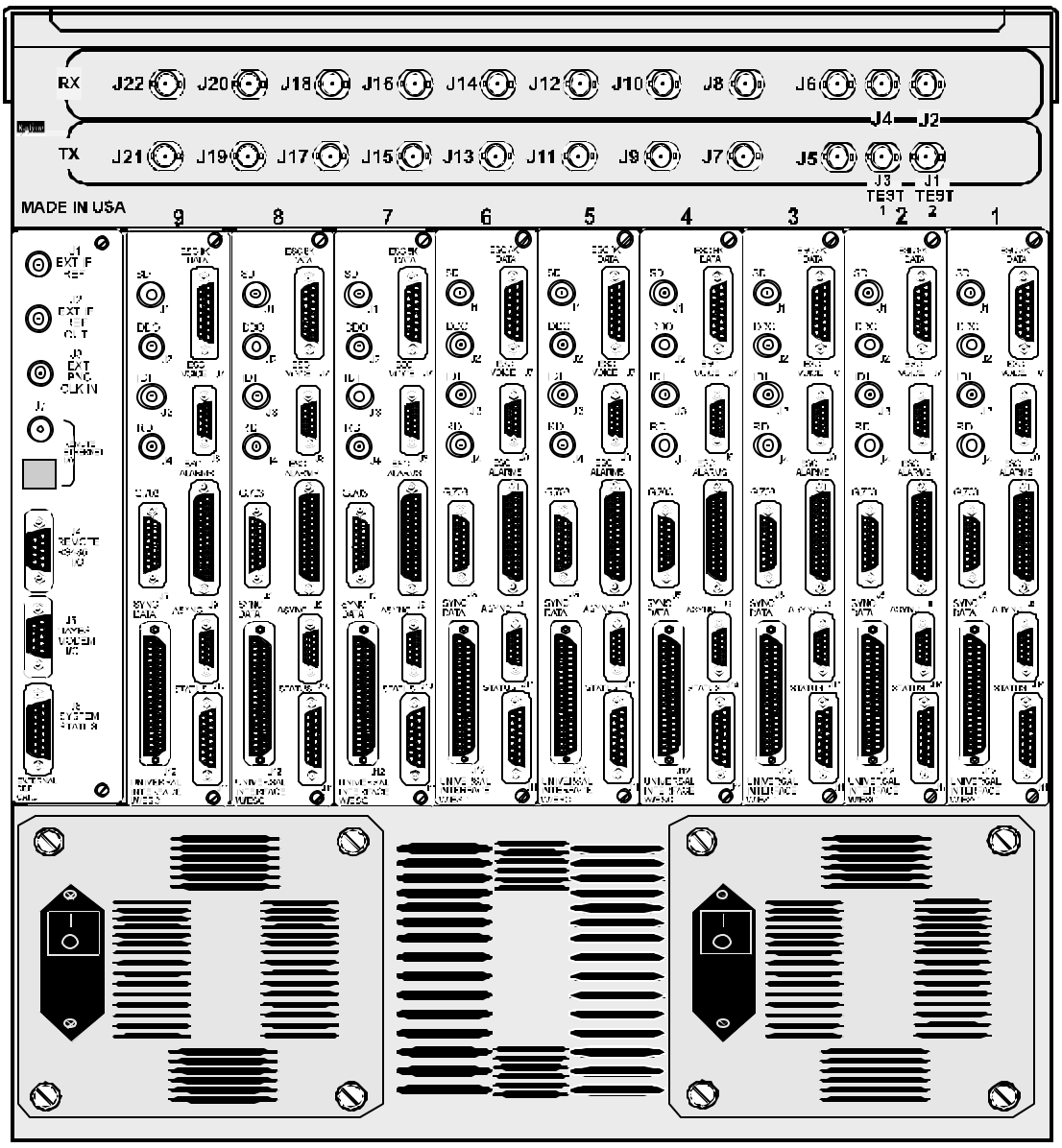


Figure 1-2. RCS10 Chassis Rear Showing I/O Cards, Power Supplies and Tx and Rx Connectors

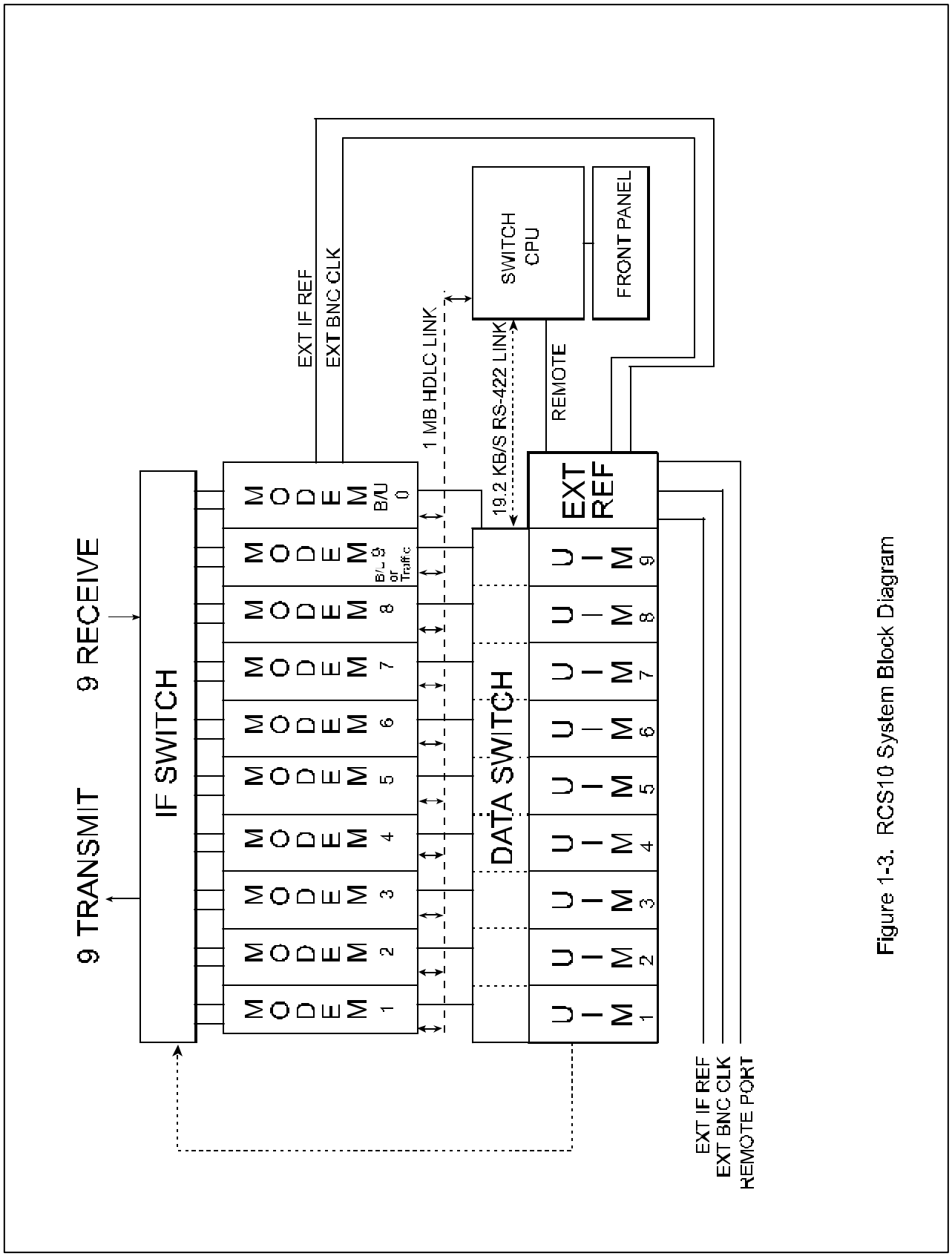


Figure 1-3. RCS10 System Block Diagram

Section 2 - Installation

2.0 Installation Requirements

This chapter instructs the user in the methods for setting up and installing an RCS10 Redundant Communication System into a Satellite Modem system.

2.1 Unpacking the System

Unseal the shipping cartons taking care not to damage the cartons, the packing material or the equipment inside. The cartons and the packing material should be saved in the event that an RCS10 will need to be reshipped. Examine the exterior of the units for any possible shipping damage.

2.1.1 List of Items

Carefully remove the units from the cartons. In addition to this manual, be sure that the following items are present:

- RCS10 Redundant Communication System
- 2 AC Power Cords
- RCS10 System Test Data Sheet

2.1.2 In Case of Shipping Damage

If any shipping damage is discovered on any of the above listed equipment, promptly contact the transporter and file a damage claim. The shipping company is responsible for any damage caused during shipping. Radyne ComStream Corporation should also be contacted.

Damage as a result of transportation is not covered under the Radyne ComStream Corporation Warranty. Refer to the Warranty section in the front of this manual for further information.

The procedure for returning faulty or damaged equipment is contained in the warranty section in the front of this manual.

2.1.3 Test Data Sheet

Each RCS10 Redundant Communication System is shipped with a Test Data Sheet. This report contains information on the results of the Switch quality control testing. The report also includes information pertaining to the system settings that were made at the factory. Radyne ComStream Corporation recommends that the user save this report for future reference.

2.2 Site Considerations

Adequate site planning and preparation simplifies the installation process and results in a more reliable system.

The user should ensure that the site has adequate electrical power, environmental controls and protection against sources of electrical radiation and interference.

2.2.1 Power Sources

The power sources should be properly grounded and as free as possible from electrical interference. If a redundant configuration is to be used, then each power cord on the RCS10 must be plugged into its own separate power circuit. Each circuit must have its own independent circuit breaker.

Grounding is achieved automatically when the three-prong power plug is inserted into a power receptacle. This should be checked by testing that there is no voltage present between the chassis of the Switch and the power line ground.

The protective ground must not be bypassed with a three-prong to two-prong adapter or defeated in any way. Defeating the ground may result in operator Injury or damage to the system.

2.3 Rack Mounting

To allow for the easy installation of cables and adequate air circulation through the units, a minimum of six inches of clearance must be provided at the sides and rear of the units. In addition, the RCS10 requires a minimum of 1-3/4 inches (1U) of clearance at the top of the unit.

The RCS10, when fully populated, weighs approximately 100 lbs. When installing into a rack enclosure, a minimum of two technicians are required to minimize personal hazard.

2.3.1 DMD10 (Modem) Installation into the RCS10 Chassis

The RCS10 is shipped with the Modems (DMD10s) and External Reference Card packaged separately for shipping purposes. All modems are universal and may be installed into any slot (1-9). The External Reference Card is installed in slot 10.

2.4 Configuring the system

If either AC line cord remains connected to the RCS10, dangerous AC voltages will be present within the unit and the cooling fans will also be operational. Although AC power is not present on the backplane, care must be taken when installing or removing a plug-in module since DC voltages will be present.

Before powering up the RCS10 or attaching cables to J12 (Sync Data RS422/RS485/V.35), the following steps **MUST** be verified in order to avoid damage to the equipment. Ensure the following:

1. The cables must be wired correctly. Refer to Table 2-1, J12 Sync Data, RS422/RS485/V.35;
2. The External Interface is programmed or supports the appropriate Interface type: RS232, RS422, or V.35;
3. The Universal Interface Module (UIM) is configured for the appropriate Interface type: RS232, RS422 or V.35.

This is **EXTREMELY IMPORTANT** as the Interface pins operate at different voltage levels depending upon the Interface type selected. **SERIOUS DAMAGE** may occur, for example, if the External Interface is operating at V.35 voltage levels and the Universal Interface is configured for RS422 voltage levels.

2.4.1 Modem Connections

All modem connections are made to labeled connectors located on the rear of the unit: The connector definitions and pinout tables are shown below, and are those on the RCS10 unit and Universal Interface Modules. Any connection interfacing to the modem must be the appropriate mating connector. Refer to Figures 2-2 and 2-3 to locate the rear panel connectors.

2.4.2 Connector Pinout Tables

The following paragraphs and tables contain the pinout information for the various data/IF connectors located on the rear panel of the RCS10.

2.4.3 Universal Interface Module (UIM) Connectors

The RCS10 chassis is shipped with the Universal Interface Modules installed. The following table lists the signals, descriptions and directions for the connectors located on the UIM. Refer to Figure 2-2 for the three possible UIM configurations.

J1 - SD - SEND DATA

Unbalanced Send Data (SD) BNC connector located on the Interface Module. Data into the modem.

J2 - DDO - DROP DATA OUT

Unbalanced Drop Data Out (DDO) BNC connector located on the Interface Module.

J3 - IDI - INSERT DATA IN

Unbalanced Insert Data In (IDI) BNC connector located on the Interface Module.

J4 - RD - RECEIVE DATA

Unbalanced Receive Data (RD) BNC connector located on the Interface Module. Data out of the modem.

J5 - G.703 (Balanced) 15-Pin Female 'D' Connector.

J7 - ESC 8K DATA INTERFACE - 15-Pin Female 'D'

J8 - ESC VOICE/64K DATA - 9-Pin Female 'D'

J9 - ESC ALARM INTERFACE - 25-Pin Female 'D'

J10 - ASYNC DATA - 9-Pin 'D' Female.

J11 - MODEM STATUS - 15-Pin 'D' Female.

J12 - SYNC DATA, RS422/RS485/RS232/V.35 - 37-Pin Female Synchronous Data Connector.

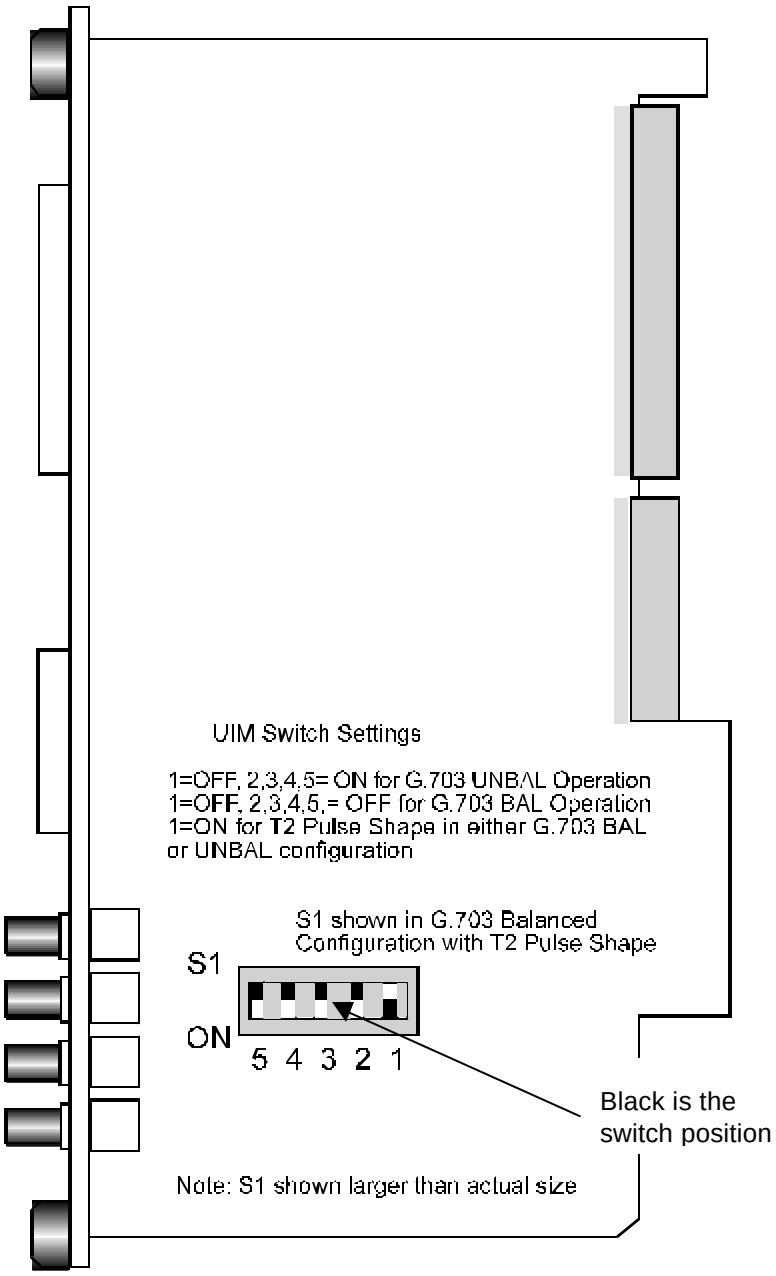


Figure 2-1. RCS10 UIM S1 Switch Settings

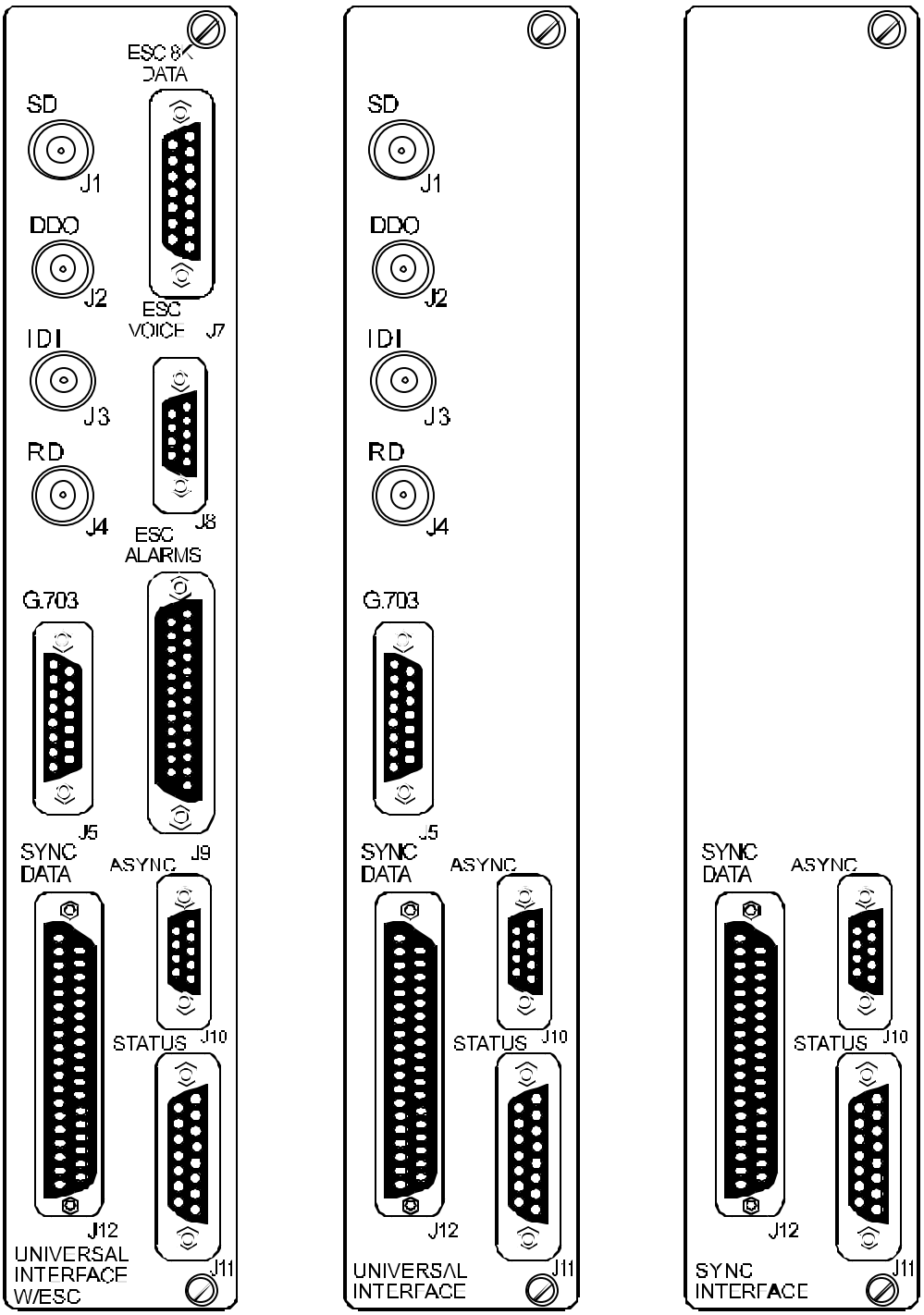


Figure 2-2. RCS10 Universal Interface Modules

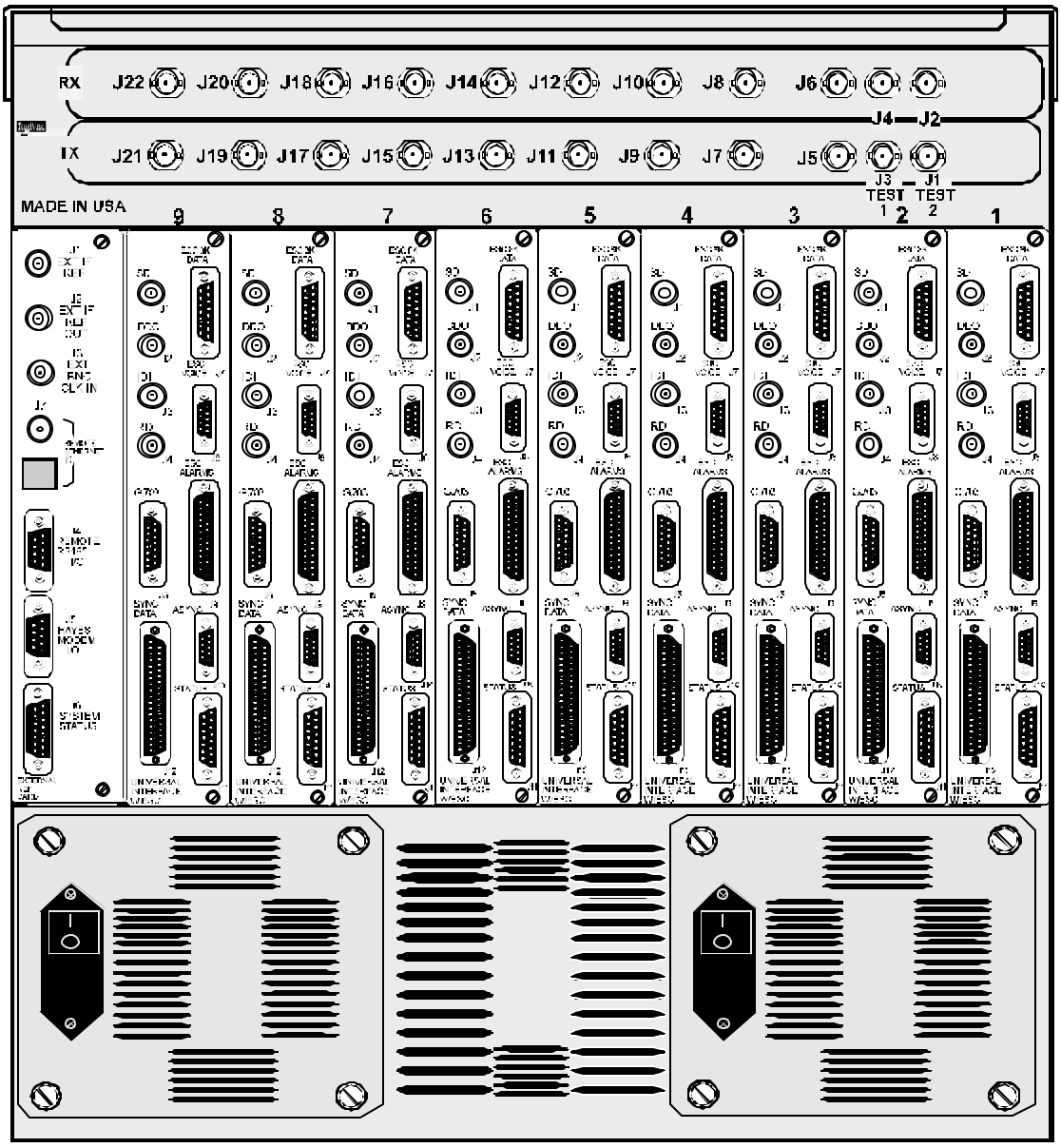


Figure 2-3. RCS10 Rear Panel

(Shown with the RCS10 ESC Options Installed)

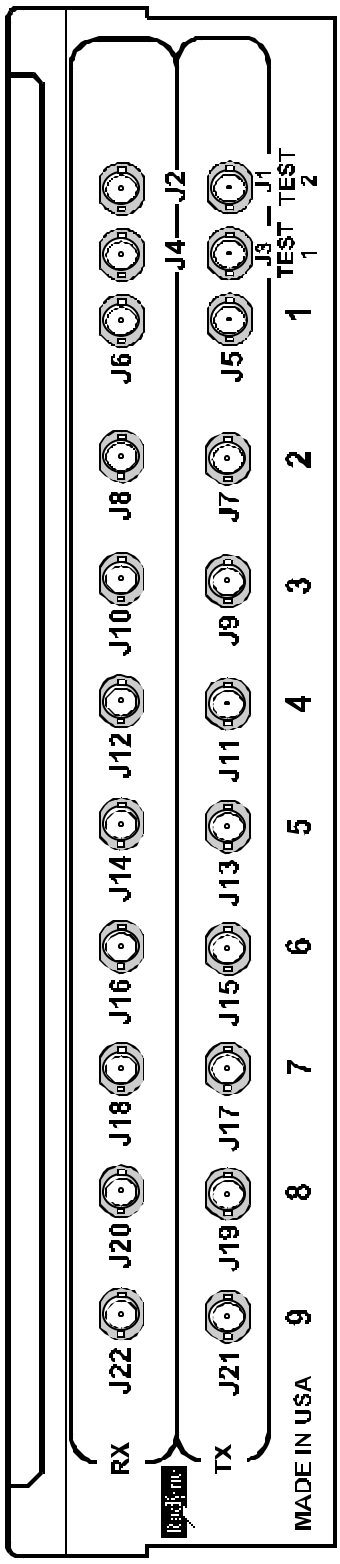


Figure 2-4. RCS10 Tx and Rx RF Connectors J1 - J22

NOTE: See Warning on Page 2-2. Verify Steps 1 through 3 Before Attaching Data Cables.

Table 2–1.
J12 - Sync Data RS422/RS485/V.35 - 37-Pin Female

Pin Number	Signal	Description	Direction
3	TXO-A	Transmit Octet (-)	Input
21	TXO-B	Transmit Octet (+)	Input
4	SD-A	Send Data A (-)	Input
22	SD-B	Send Data B (+)	Input
5	ST-A	Send Timing A (-)	Output
23	ST-B	Send Timing B (+)	Output
6	RD-A	Receive Data A (-)	Output
24	RD-B	Receive Data B (+)	Output
7	RS-A	Request to Send A (-)	Input
25	RS-B	Request to Send B (+)	Input
8	RT-A	Receive Timing A (-)	Output
26	RT-B	Receive Timing B (+)	Output
9	CS-A	Clear to Send A (-)	Output
10	MF	Mod Fault - Open Collector	Output
28	DF	Demod Fault - Open Collector	Output
27	CS-B	Clear to Send B (+)	Output
11	DM-A	Data Mode A (-)	Output
29	DM-B	Data Mode B (+)	Output
13	RR-A	Receiver Ready A (-)	Output
31	RR-B	Receiver Ready B (+)	Output
15	EXC-A	External Clock A (-)	Input
33	EXC-B	External Clock B (+)	Input
16	RX-0-A	Receive Octet A (-)	Output
34	RX-0-B	Receive Octet B (+)	Output
17	TT-A	Terminal Timing A (-)	Input
35	TT-B	Terminal Timing B (+)	Input
1, 19, 20, 37	GND	Signal Ground	

J5 - G.703 (Balanced)

Table 2-2 below lists the pinouts and signal definitions for the G.703 (Balanced) 15-pin connector.

Table 2-2.

J5 - G.703 (Balanced) 15-Pin Female 'D' Connector

Pin No.	Signal Name	Signal	Direction
1	Send Data (-)	SD-A	Input
9	Send Data (+)	SD-B	Input
3	Receive Data A (-)	RD-A	Output
11	Receive Data B (+)	RD-B	Output
12	Drop Data Out (-)	DDO-A	Output
5	Drop Data Out (+)	DDO-B	Output
13	Insert Data In (-) EXC (-)	IDI-A	Input
6	Insert Data In (+) EXC (+)	IDI-B	Input
14	MF	Mod Fault Open Collector	Output
15	DF	Demod Fault Open Collector	Output
7	G703-EXC-A	External Clock A (-)	Input
8	G703-EXC-B	External Clock B (+)	Input
2, 4	GND	Signal Ground	

J7 - ESC 8K Data Interface

Table 2-3

J7 - ESC 8K Data Interface - 15-Pin Female 'D'

Pin No.	Signal	Description	Direction
1	ESCRXO-B	Rx Octet-B	Output
2	ESCRXC-B	Rx Clock-B	Output
3	ESCRXD-B	Rx Data-B	Output
4	NC		

5	NC		
6	ESCTXD-A	Tx Data-A	Input
7	ESCTXC-A	Tx Clock-A	Output
8	ESCTXO-A	Tx Octet-A	Output
9	ESCRXO-A	Rx Octet-A	Output
10	ESCRXC-A	Rx Clock-A	Output
11	ESCRXD-A	Rx Data-A	Output
12	GND		
13	ESCTXD-B	Tx Data-B	Input
14	ESCTXC-B	Tx Clock-B	Output
15	ESCTXO-B	Tx Octet-B	Output

J9 - ESC Alarm Interface

Table 2-4.
J9 - ESC Alarm Interface - 25-Pin Female 'D'

Pin No.	Signal	Description	Direction
1	GND		
2	ESCBWO 1NO	Backward Alarm Out-1 NO	
3	NC		
4	ESCBWO 2NO	Backward Alarm Out-2 NO	
5	NC		
6	ESCBWO 3NO	Backward Alarm Out-3 NO	
7	GND		
8	ESCBWO 4NO	Backward Alarm Out-4 NO	
9	NC		
10	ESCBWI 2	Backward Alarm In 2	Input
11	ESCBWI 4	Backward Alarm In 4	Input
12	NC		
13	NC		
14	ESCBWO 1C	Backward Alarm Out-1 C	
15	ESCBWO 1NC	Backward Alarm Out-1 NC	
16	ESCBWO 2C	Backward Alarm Out- 2 C	

17	ESCBWO 2NC	Backward Alarm Out- 2 NC	
18	ESCBWO 3C	Backward Alarm Out- 3 C	
19	ESCBWO 3NC	Backward Alarm Out- 3 NC	
20	ESCBWO 4C	Backward Alarm Out- 4 C	
21	ESCBWO 4NC	Backward Alarm Out- 4 NC	
22	ESCBWI 1	Backward Alarm In- 1	Input
23	ESCBWI 3	Backward Alarm In- 3	Input
24	NC		
25	NC		

J8 - ESC Audio/64K Data

Table 2-5

J8 ESC Audio/64K Data - 9-Pin Female 'D'

Pin No.	Signal	Description	Direction
1	ESCAUDTX 1A	Tx Audio 1A/TxD 64K-A	Input
2	ESCAUDRX 1A	Rx Audio 1A/RxD 64K-A	Output
3	GND	Signal Ground	
4	ESCAUDTX 2B	Tx Audio 2B/TxC 64K-B	Input
5	ESCAUDRX 2B	Rx Audio 2A/RxC 64K-B	Output
6	ESCAUDTX 1B	Tx Audio 1B/TxD 64K-B	Input
7	ESCAUDRX 1B	Rx Audio 1B/RxD 64K-B	Output
8	ESCAUDTX 2A	Tx Audio 2A/TxC 64K-A	Input
9	ESCAUDRX 2A	Rx Audio 2A/RxC 64K-A	Output

J10 – Async Data - 9-Pin Female 'D'

Table 2-6.

J10 – Async Data - 9-Pin Female 'D'

Pin No.	Signal	Description	Direction
1	RXD_B	Receive Data B	Output
2	RXD_A	Receive Data A	Output

3	TXD_A	Transmit Data A	Input
4	TXD_B	Transmit Data B	Input
5	GND	Signal Ground	-------
6	DSR	Data Set Ready	Output
7	RTS	Request to Send	Input
8	CTS	Clear to Send	Output
9	NC	No Connection	---------

J11 – Modem Status

Table 2-7.
J11- Modem Status 15-Pin 'D' Female

Pin No.	Signal Name	Signal	Direction
1	Mod Fault - C	MF-C	No Dir.
2	Mod Fault - NC	MF-NC	No Dir.
3	Mod Fault - NO	MF-NO	No Dir.
4	Demod Fault - C	DF-C	No Dir.
5	Demod Fault - NC	DF-NC	No Dir.
6	Demod Fault - NO	DF-NO	No Dir.
7	Common Equipment Fault - C	CEF-C	No Dir.
8	Common Equipment Fault - NC	CEF-NC	No Dir.
9	Common Equipment Fault - NO	CEF-NO	No Dir.
10	Prompt - NO	NC	No Dir.
11	Prompt - NC	NC	No Dir.
12	Deferred - NO	NC	No Dir.
13	Deferred - NC	NC	No Dir.
14	Prompt C/AGC +	AGC Out	No Dir./Output
15	Deferred C/AGC -	GND	No Dir./Output

2.5 External Reference Card Section

The External Reference Card plugs into slot 10 on the rear of the RCS10 (refer to Figure 2-3). The External Reference module has one external IF reference input which is distributed to all ten DMD10 modems. Each modem's on-board system oscillator can be individually locked to the external reference.

Additionally, the external reference module can be equipped with a 10^{-7} high stability reference oscillator that is distributed to all ten DMD10 modems providing a low-cost high-stability option. An External IF Reference Output (J2) is also provided for distribution to other equipment.

Also, the external reference has one BNC clock input (J3) that is distributed to all ten modems. Each modem control can independently select this external clock as its TX clock and/or RX buffered clock source. The connections and descriptions are as follows:

J1 - EXT IF REF IN (BNC)

J1 provides an input for external clocking that can be selected by a particular modem (1-9). A modem selecting this external clock will then lock its IF circuitry to this signal.

J2 - EXT IF REF OUT (BNC)

J2 provides a clock reference output that may either be the same as the input to J1 discussed above or the onboard RCS10 high-stability reference.

J3 - EXT BNC CLK IN (BNC)

J3 is the External BNC Clock Input that can be selected by a particular modem (1-9) for data clocking.

J4 - Remote RS485 I/O (9-Pin Female 'D')

J4 is the Remote RS485 I/O port. See Table 2-8 for the connector pinouts.

J5 - Remote Terminal Port (9-Pin Female 'D')

J5 is the RSC10 Remote Terminal Port. See Table 2-9 for the connector pinouts.

J6 - System Fault Summary Relays (15-pin Female 'D')

J6 is the System Fault Summary Relays connector. See Table 2-10 for J6 connector pinouts.

J7/J8 - Optional Remote Ethernet Connections - J8/10BASE-T (Twisted pair), J7/10BASE-2 Coaxial Transceiver Interface. See below for a description of these interfaces.

2.5.1 Ethernet Interface

With the Ethernet option installed, the software will sense its presence and enable the corresponding display states. The user can select from three different cabling options: 10BASET, 10BASE2 and 10BASE5. The node ID address, the Ethernet chip operating modes, and the configuration and initialization settings are user-selectable.

Only the 10BASET interface and the TCP/IP protocol are available with the basic Ethernet option. 10BASE2 and 10BASE5 cabling options, UDP/IP and Remote Terminal protocols, and TFTP, TELNET, BOOTP servers are options.

J4 - Remote RS485 I/O

Table 2-8.
J4 – Remote RS485 I/O - 9-Pin Female 'D'

Pin No.	Signal	Description	Direction
1	TXD_MCS_B	Transmit Data M&C B	Output
2	Not Used		
3	Not Used		
4	Not Used		
5	GND	Ground	
6	TXD_MCS_A	Transmit Data M&C A	Output
7	Not Used		
8	RXD_MCS_B	Receive Data M&C B	Input
9	RXD_MCS_A	Receive Data M&C A	Input

J6 - System Fault Summary Relays

Table 2-9.
J6 - System Fault Summary Relays - 15-Pin Female 'D'

Pin No.	Signal
1	Mod Fault - Common
2	Mod Fault - Normally Closed
3	Mod Fault - Normally Open
4	Demod Fault - Common
5	Demod Fault - Normally Closed
6	Demod Fault - Normally Open
7	Common Equipment Fault - Common
8	Common Equipment Fault - Normally Closed
9	Common Equipment Fault - Normally Open
10	SW - Normally Open

11	SW - Normally Closed
12	MA - Normally Open
13	MA - Normally Closed
14	SW - Common
15	MA - Common

Section 3 - Operation

3.1 Operating Procedures

Operation of the RCS10 consists of controlling the unit operating parameters and monitoring status and responses via one of the control interfaces. Control options for the RCS10 are as follows:

1. Front Panel Control
2. Terminal Mode Control
3. Remote Computer Mode Control
4. Remote SNMP Control

Any of the above methods may be used separately or together to monitor and control the RCS10.

3.1.1 Front Panel Control

The front panel of the RCS10 allows complete control and monitoring of all Modem and Switch parameters and functions via a keypad, LCD display, Modem and Switch status LEDs and LED indicators on the DMD10 modems.

3.1.2 Front Panel Layout and Features

The RCS10 Front Panel layout is shown in Figure 3–1. The front panel is divided into the following functional areas: the LCD front panel display, the Modem and Switch, the Keypad and the LED Indicators, each described below. Refer to Table 3-1 for a brief description of the RCS10 front panel controls and indicators.

3.1.3 Front Panel LCD Display

The front panel display is an 8 line by 40 character LCD display. The display is lighted and the brightness can be set to increase when the front panel is currently in use. The LCD display automatically dims after a period of inactivity that is programmable from the front panel.

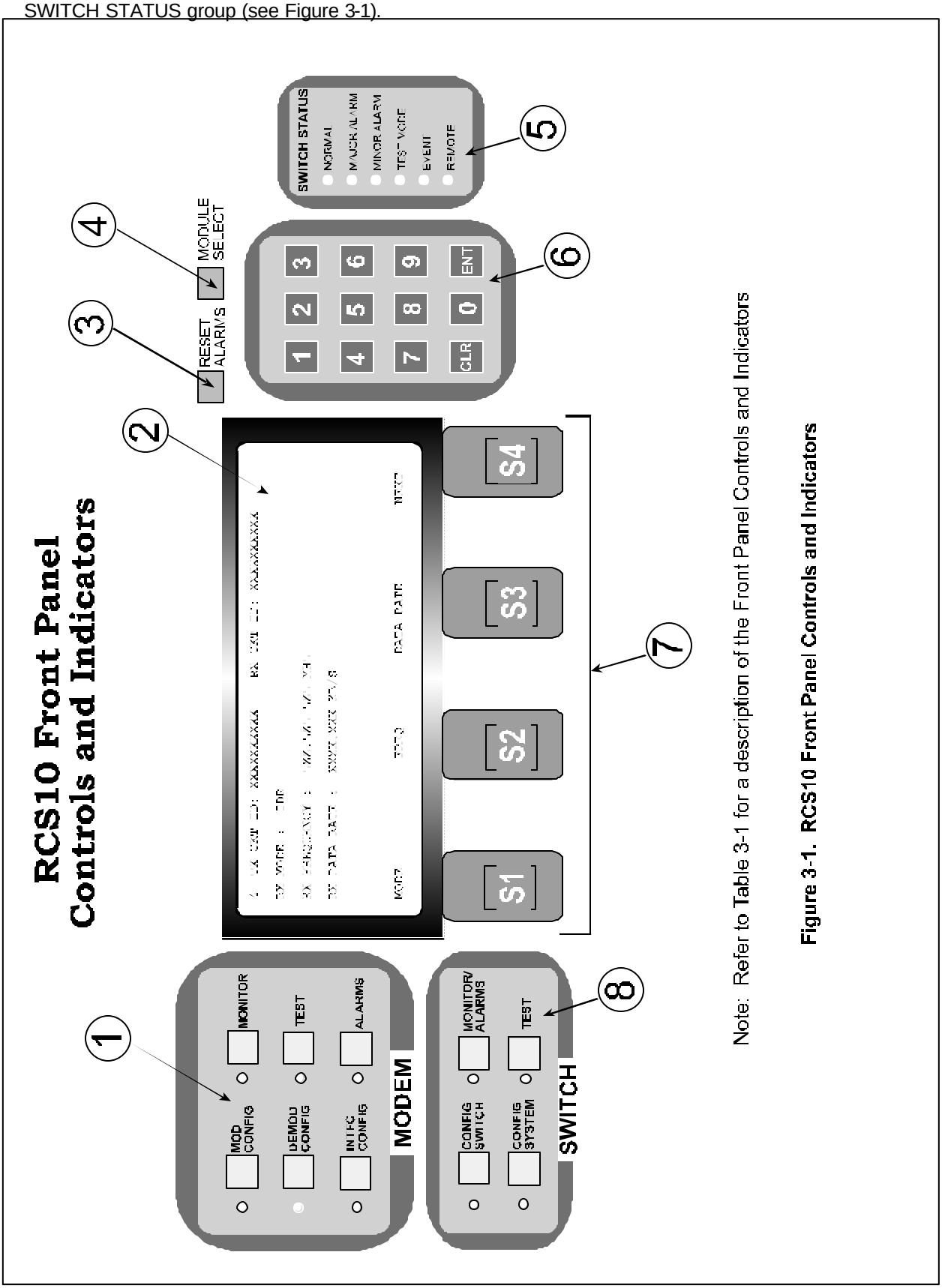
The display has two distinct areas showing current information. The bottom row of the display shows the functions of each of the four softkeys (labeled ‘S1’, ‘S2’, ‘S3’, and ‘S4’ in Figure 3-1). If a softkey provides a function, then that function will be displayed just above the corresponding key. If no function is displayed above a softkey, then there is no function associated with that key, and pressing it will have no effect. The rest of the display shows current parameter and status information. The LCD display is a window into a large matrix of switch and modem parameters that can monitored and changed from the front panel.

The ten keys contained in the MODEM and SWITCH are used to view and change a particular set of control parameters as described by the label next to the key. Each of these keys are used to display a series of menu trees that are displayed on the LCD and used to view and enter control parameters. These keys and their corresponding menus are described separately below:

3.1.4 Front Panel LCD Indicators

There are sixteen (16) LEDs on the RCS10 front panel to indicate the selected LCD menu tree and current switch status. The color of the illuminated LEDs on the front panel indicate overall switch status according to the following key: An illuminated green LED indicates normal operation. An illuminated yellow LED indicates a condition that is not proper for normal operation, however, all satellite channels are currently on-line. An illuminated red LED indicates that the RCS10 was unable to provide redundancy protection for a satellite channel, and at least one channel is off-line. For the purposes of this discussion, the LEDs are separated into two major groups, MENU LEDs and SWITCH STATUS LEDs. The Menu LEDs are those LEDs immediately next to the front panel

keys in the MODEM and SWITCH groups, and the SWITCH STATUS LEDs are those in the SWITCH STATUS group (see Figure 3-1).



Note: Refer to Table 3-1 for a description of the Front Panel Controls and Indicators

Figure 3-1. RCS10 Front Panel Controls and Indicators

Table 3-1. RCS10 Front Panel Control and Indicator Descriptions

Figure 3-1 Item Number	Description	Function
1	Modem Section	Modem Control. This group of keys is used to control the Ten DMD10 modems from the RCS10 front panel. See paragraph 3.1.5 below for a detailed listing of these six functional pushbuttons.
2	Front Panel LCD Display	8-Line by 40-character Liquid Crystal Display that allows the operator to communicate with the RCS10.
3	Reset Alarms Pushbutton	Reset Alarms. This key resets all RCS10 current and latched minor and major alarms.
4	Module Select	Select current modem. This key selects which DMD10 modem is currently being controlled by the 'MODEM' group of function keys.
5	Switch Status	Status LEDs. These LEDs illuminate or extinguish to indicate the current RCS10 M:N Switch status and modes of operation.
6	Numeric Keypad	Numeric keypad that allows the operator to enter numeric parameters on the front panel display, clear an entry or enter inputted data.
7	Soft Keys 1 through 4	Located below the LCD display, these function pushbuttons correspond to the displayed data and prompts on the bottom line of the LCD display. These function keys allow the operator to make choices, scroll backward or forward, and enter specific parameters.
8	Switch Section	Switch Control. These function keys allow for control of the RCS10 M:N Switch. See paragraph 3.1.6 for a detailed listing of these four function keys.

3.1.5 RCS10 Modem Section LED Indicators

The following RCS10 Modem Section LED Indicators will illuminate when any one of the following selection pushbuttons have been depressed.

NOTE: Refer to the front panel illustrations in this section for detailed screen displays.

1. **Mod Config:** Allows operator to set all DMD10 Tx parameters starting at the top level screen. These parameters include the following: Mode, Frequency, Data Rate, Framing, Inner and Outer FEC, Modulation type, Scrambler type and Filter Mask.
2. **Demod Config:** Allows operator to set all DMD10 Rx parameters starting at the top level screen. These parameters include the following: Mode, Frequency, Data Rate, Framing, Inner and Outer FEC, Modulation type, Scrambler type and Filter Mask.
3. **Intfc Config:** Takes the operator to the Interface Configuration settings main screen. Pressing this key brings up a series of menus on the LCD that allow control of the terrestrial interface for the currently selected modem. The currently selected modem can be changed by pressing the MODEM SELECT key.
4. **Monitor:** Pressing this key brings up a series of menus on the LCD that allow the monitoring of status parameters for the ten RCS10 modems. The status parameters include Mod and Demod status, voltage levels and Stored Event status.
5. **Test:** Pressing this key brings up a series of menus on the LCD that allow testing of the ten RCS10 modems. Tests that can be performed include the following: Baseband loopback, Terrestrial loopback, IF loopback, Carrier Mode, Inject Mod fault and Inject Demod fault.
6. **Alarms:** Pressing this key brings up a series of menus on the LCD that allow the monitoring of major, minor and latched alarms for the ten RCS10 modems. The top level menu shows the currently selected modem's Mod and Demod summary alarms.

3.1.6 Redundancy Switch Front Panel Section LED Indicators.

1. **Switch - Config Switch**

   Pressing this key brings up a series of menus on the LCD that allow control of the RCS10 M:N Switch configuration parameters.

2. **Switch - Config System**

   Pressing this key brings up a series of menus on the LCD that allow control of the RCS10 M:N Switch system, monitor & control, and communication parameters.

3. **Switch - Monitor/Alarms**

   Pressing this key brings up a series of menus on the LCD that allow monitoring of major and minor alarms and control of alarm masking for the RCS10.

4. **Switch - Test**

   Pressing this key brings up a series of menus on the LCD that allow testing of the RCS10 M:N Switch configurations and connections.

3.1.7 Menu LED Indicators

Each Menu LED corresponds to the MODEM group or SWITCH group key located to the right of the LED. When lit, these LEDs indicate which menu tree is currently active on the LCD. For example, if the SWITCH-TEST LED is illuminated, then the LCD is displaying one of the menus that allow control of RCS10 test modes.

3.1.7.1 SWITCH STATUS LED Indicators (Color as indicated below)

Normal: *Green* - indicates that the unit is currently under power

Major Alarm: *Red* - indicates that at least one satellite channel did not receive redundancy protection and is off-line.

Minor Alarm: *Yellow* - indicates that a redundancy warning exists and the RCS10 may not be providing redundancy protection.

Test Mode: *Yellow* - indicates that the switch is performing one of the system tests.

Event: *Yellow* - indicates that a condition or system event has occurred that the RCS10 has stored in memory. The events may be viewed from the Front Panel or from the Terminal port.

Remote: *Green* - indicates that the unit is set to respond from either the Terminal port or the Remote M&C port

3.1.8 Local/Remote Control

The switch operates in both Local and Remote modes. In Local mode, changes to the system's configuration can be implemented only from the RCS10 front panel. Remote access to the system is limited to a query of status information only. While in the local mode, the switch responds to remote commands with the Error Message 'Not Allowed in Local Mode."

In Remote Mode, configuration commands can be issued from a 'Dumb' terminal, a computer, or a network through the system's built-in Ethernet channel. The terminal and computer interfaces to the switch are mutually exclusive. In Remote mode, all front panel switches used to change operating parameters are locked out and changes can only be made remotely. LEDs and displays remain operational, however.

The only configuration command allowed into the system, whether it is in Local or Remote mode, is a change in Control mode. The user can command the system to go into local or remote modes from the front panel, dumb terminal, computer M&C or a network.

3.1.9 Terminal Control

The switch will emulate a WYSE-50, ADDS-VP or VT-100 dumb terminal. It will display a Main Menu and prompt the user to select the equipment to monitor and control. If the system is in Remote mode, configuration parameters can be altered. If the system is in Local mode, however, no commands are allowed except for a control mode change.

Terminal mode has several basic display screens that show the current status of the RCS10's modes and variables. The screens will show both status and control variables. Only the Control variables can be modified. To modify a variable, the user will enter the variable number at the prompt followed by a carriage return. The cursor then will move to the variable area and the user will either type in a new value or press the space bar to scroll through the available selections.

3.1.10 Remote M&C Interface

The interface to a remote computer and monitor system is done through the Radyne ComStream RLLP protocol. There are two types of packets the switch can receive; Direct and Encapsulated. Direct packets are those intended for the switch, and Encapsulated packets are those intended for the modem or the UIMs. The Encapsulated packets are embedded in the switch's relay command.

3.1.11 SNMP Control

The Simple Network Management Protocol (SNMP) is used to monitor and control the RCS10 Switch parameters when the Switch is connected to a network. On a network, a client is one host, an SNMP Manager communicates with a server in another host, an SNMP Agent. The Manager, a remote M&C, requests the agent (RCS10 Switch) to read or write information (objects) in a Management Information Base (MIB) resident in the Agent. Refer to Addendum A in the back of the manual for additional information and a complete compilation of the RCS10 MIB.

3.1.12 Manual/Automatic Backup Modes

The switch operates in both Manual and Automatic backup modes. In Automatic Mode, a failed unit will be automatically replaced with a Backup unit if a Backup unit is available. However, if an online Modulator or Demodulator fails while it is set to Manual mode, it will not be automatically backed up.

There are two types of Automatic backup modes; Revertive and Non-revertive. In Automatic Revertive mode, a failed unit is replaced with the backup unit after the fault delay time has passed. The failed unit continues to be monitored and if the failure condition clears itself, and another failure occurs with no available backup units, then the Switch will automatically 'Unback' the passing unit and then backup the newly failed unit. In Automatic Non-Revertive mode, a failed unit is replaced by the Backup unit after the Fault Delay time has elapsed. However, if the failure condition clears itself, the Switch does not return the failed unit back online if another monitored unit fails and no backup units are available. The failed channel can be unbacked manually using the <BACKUP> front panel selection.

3.1.13 Standby Modes

A backup unit can be set to three standby modes; self-test, hot standby and preemptable. In self-test mode, the backup Modulator's IF output is looped into the IF input of the backup demodulator and performance is continually checked.

In hot standby mode, the backup modulator and/or demodulator settings are matched to that of a priority online modulator and/or demodulator so that if a modulator and/or demodulator fails, it will immediately be replaced by a backup. The other modems are still monitored and will be backed up, but the switchover will be longer.

In preemptable mode, the backup modulator or demodulator is used online. However, if another modem, covered by the backup fails, the backup will be preempted and will backup the failed modem.

3.1.14 Test Port Operation (Operational on Backup Modem 2 Only)

The backup channel's terrestrial interfaces can be used to test the operation of the channels that they cover. On the modulator side, the test port can be tied to any modulator that the backup is monitoring and used to inject baseband test signals into the online modem. On the demodulator side, the test port is used to monitor the demodulator output of the online modem. The user can set the test port selections by specifying the modulator and/or demodulator that is connected to a backup's Mod and Demod test ports from any of the available user interfaces.

3.1.15 Backup/Online

When a modem is first installed into the RCS10, it is set up as an online unit by default. It is up to the user to change its configuration from 'online' to 'backup,' and to set up a backup pool for it if configured as a backup, or add it or remove it from a backup pool if set up as online. These configuration settings are performed on the front panel through the <SWITCH CONFIG> key.

The backup algorithm operates in both manual and automatic revertive and non-revertive modes with automatic backup assignments and priority levels. There is a limit on the total number of backup attempts for any prime. Once a failed prime is flagged for backup, a ' * ' is displayed on the prime backup assignment front panel screen to indicate a backup is in progress. A ' B ' or a ' BB ' will replace the ' * ' if the backup is successful, otherwise another backup attempt is made. After three failed backup attempts, an ' F ' or ' FF ' is displayed and the prime is removed from the 'backup modem' backup pool. No further backup attempts are made. The backup modem is now available to backup any other failed prime in its pool.

There are two ways a failed prime can be placed back in the backup pool. The first is when the summary fault status changes, the other is through user intervention. Setting of the backup assignment, priority, and backup modes clears the total number of backup attempts.

3.2 Guide to Front Panel Monitor and Control

The front panel can be used to perform complete monitor and configuration of the RCS10. The operation of the front panel becomes easy after a short period of use in which the user becomes familiar with the basic concepts and operations. Front panel control is implemented as a series of data entry 'screens.' The screens are organized into several groups that contain related parameters and status values. Screens allow the modification of control parameters, display of status parameters, or both. Different screens will be displayed on the front panel based on keypresses from the front panel. The screens will be displayed in order; this order defines the 'menu tree' for a particular group of related screens.

3.2.1 Remote Port Control

When in Computer Mode, the RCS10 uses an RS485 Serial Control Port (Remote Port) for use with computer-controlled remote monitor and control systems. The Remote Port is a 9-pin female 'D' sub connector (J3) located at the rear of the unit on the External Reference Card. The pinouts for the remote port are listed in Section 2. The remote port supports standard UART asynchronous protocol with 8 data bits, no parity, and 1 stop bit (8N1) at 4 baud rates: 9600, 4800, 2400, and 1200. The Remote Port utilizes a binary protocol called Radyne Link Level Protocol (RLLP). The RLLP is a multi-drop, packet-oriented protocol with handshaking, and is described in Appendix B at the end of this manual.

3.2.2 Terminal Port Control

When in Terminal Mode, the RCS10 uses an RS232 serial port (Terminal Port) for use with a separate terminal or computer running a terminal emulation program. The Terminal Port is a 9-pin female 'D' sub- connector (J2) located at the rear of the unit on the External Reference Card. The pinouts for the RS232 port are listed in Section 2, "Installation." The terminal port supports standard UART asynchronous protocol with 8 data bits, no parity, and 1 stop bit (8N1) at 3 baud rates; 19200, 9600, and 2400.

The Terminal Interface is menu-driven and allows complete monitoring and control of all RCS10 parameters. Three terminal emulation protocols are supported: DEC VT-100, Wyse-50, and ADDS Viewpoint. The terminal display is a full-screen presentation of the current status of the RCS10 modes and variables. The screens will display both status and control variables. The status variables cannot be modified, but the control variables can be. Each variable that can be modified will have a display number next to the value. Changing the value is accomplished by typing the number of the variable to be changed. Two types of input may then be requested from the user. If the input is multiple choice, the space key must be pressed to cycle the available choices until the desired value is displayed. The 'Enter' or carriage return key must then be pressed for the new value to take effect. If the input is numerical, the desired value should be typed using number keys

('0' to '9'), then pressing the 'Enter' key. An input can be aborted at any time by pressing the 'ESC' key. If an invalid value is entered, an error message will be displayed on the terminal.

Following a valid input, the RCS10 places the new settings into nonvolatile RAM, changing the switch configuration immediately and storing the configuration for the next time the unit is powered up.

3.3 Backup Handler

The switch operates both in manual and automatic backup modes. In automatic mode, a failed unit will be automatically replaced with a backup unit if a backup is available. However, if an online Modulator or Demodulator fails while it is set to manual mode, it will not be automatically backed-up. Backup mode is accessed in the <CONFIG SWITCH> menu.

To manually back up a modem, set the desired backup (1 or 2) to 'Manual' in the <CONFIG SWITCH> menu and then in <FORCE MANUAL BACKUP>. Also, in the <CONFIG SWITCH> menu, select the backup that is in 'Manual' mode and enter the number of the prime modem to be backed up. Backup 2 can select available modems between 1-8. Backup 1 can select available modems between 1-8 or 1-9 if backup 2 is set for traffic.

There are two types of Automatic Backup Modes: Revertive and Non-revertive. In Revertive mode, a failed unit is replaced by the Backup unit after the fault delay time passes. The failed unit continues to be monitored, and if the failure condition clears itself and another failure occurs with no available Backup units, then the SWITCH will automatically unback the passing unit and then back up the newly failed unit.

In Non-revertive mode, a failed unit is replaced by the Backup unit after the fault delay time passes. However, if the failure condition clears itself, the SWITCH does not return the failed unit back online if another monitored unit fails and no Backup units are available. The failed channel can be unbacked manually by setting the BACKUP unit to manual using the front panel <BACKUP> selection located in <CONFIG SWITCH> and instructing it to manually back modem #0.

There are two types of delays available to the user in the RCS10 Switch. The Fault Delay time for each Modulator and Demodulator is preprogrammed by the operator to be between 0 and 299.9 seconds through the <CONFIG SWITCH> Menu. The SWITCH continually checks for the return of a good signal during the delay time. If the signal returns, no switchover takes place and the timer is reset. If more than one unit fails, the first one to timeout will be the first one that is replaced until no Backup units are available.

If the unit is still inoperative at the end of the delay time, and the backup unit is available, then the backup takes place. If the backup unit is in both automatic and hot standby modes, then if the online unit (the one the backup is standing by for) fails, it will automatically be backed-up regardless of fault delay.

The other type of delay available to the user is the Acquisition Delay. This is the amount of time it takes the Demodulator to acquire lock. When a Prime fails, the backup unit has up to the programmed Acquisition Delay to lock. If it fails to lock, a Major Alarm is asserted along with a descriptive event logged in the Event Buffer. Backup status faults will also be generated to 'Flag' the unsuccessful backup.

The Backup Modem has up to three attempts to successfully backup a prime. If it fails, an 'F' or 'FF' is displayed on the Backup Summary front panel screens and the Prime is removed from the 'Backup Modem' backup pool. No further backup attempts are made.

Nine different priority levels may also be set and are used by Revertive switching to make a decision to drop a link that is already being backed up in favor of another link of higher importance. As long as a free backup modem remains, that backup will handle the outage. Should no free backups exist, then any outage is considered for backup on a priority basis. Priority is set with 1 being

highest and 9 being lowest priority. Priority setting may be accessed in the <CONFIG SWITCH> menu.

3.3.1 1:N or 2:N Switching

The SWITCH is very flexible in set-up options. It may be set up as M:N or 2 1:Ns simply by instructing the switch as to which backup is assigned which primes for auto-mode backup. This is located in the <CONFIG SWITCH> menu. Setting Backup 1 and Backup 2 for M/D or MD backup (Mod/Demod or Modem switching respectively) of all 8 primes would give a 2:8 switch setup. If backup 1 were set for M/D or MD backup of prime 1, 2, 3 and backup 2 were set for M/D or MD backup of primes 4, 5, 6, 7, 8, then this would net two 1:N setups with the first being a 1:3 and the second being a 1:5. Any combination using the available backups and primes can be achieved.

Additionally, if backup 2 were set for traffic (again in the <CONFIG SWITCH> menu) instead of backup operation, you could then achieve a switching of 1:9.

3.4 RCS10 'Learn' Feature

This section describes the Learn and the Backup Test features

3.4.1 Description

During backups, when primes modems are failing, it is essential that a good known system configuration be used. In order to ensure that the backup process is successful, the Learn and Backup Test features are used to complement the backup algorithm by providing a snapshot of a known good state of the system.

The switch holds images of all modems current status and control parameters. These can be viewed and/or modified through the front panel, computer, and Ethernet interfaces. Once satisfied with the system's operation, the user can, at any time, initiate a Learn of one or all the modem parameters. The latter are to be used during backups (learned modem configuration) and are stored in nonvolatile memory.

The Backup Test Feature can be used in conjunction with the Learn Feature to ensure that the backup is capable of backing up primes that are part of its pool.

Here is the three-step process:

- Assign a backup(s) to the prime modem(s) to be learned;
- Learn the prime modem(s);
- Ensure that the assigned backup(s) is capable of backing up the prime modem(s).

It is essential that the user learn the configuration of the prime modems in the system. During backups, if the prime modem configuration has previously changed, the backup modem(s) will be configured with the older parameters.

Learned and current modem configuration images are periodically monitored for any discrepancies. A switch minor alarm as well as module alarm status bit(s) are asserted if there are differences between the two. To draw the user attention to the prime modem configuration change, the switch minor alarm LED flashes if the configuration change alarm status is not masked. Once a modem is part of an auto backup pool, the user shall be notified of any changes to the modem configuration. User intervention will be required to acquire a new modem's configuration.

3.4.2 Alarms & Reports

Every time a modem is queried, its learned and current configurations are compared. Any differences are time/date stamped and logged as a warning event. A switch minor alarm and a bit(s) in the switch module status alarms are asserted as well. If the prime modem configuration change alarm status is not masked, the switch minor alarm LED also flashes.

Every time a backup test fails, an event is time/date stamped and logged as an alarm event. A switch minor alarm and bits in the switch module status alarms indicate the backup test status of the particular prime. These bits reflect the status of both backup 1 and 2.

Popup error messages or error returns are also generated whenever commands to learn a modem or modems are unsuccessful. Possible errors are as follows:

MODEM_NOTPRESENT =	Modem not present
MODEM_NOBACKUP =	Modem not part of a backup pool
MODEM_COMMERROR =	Modem communication error

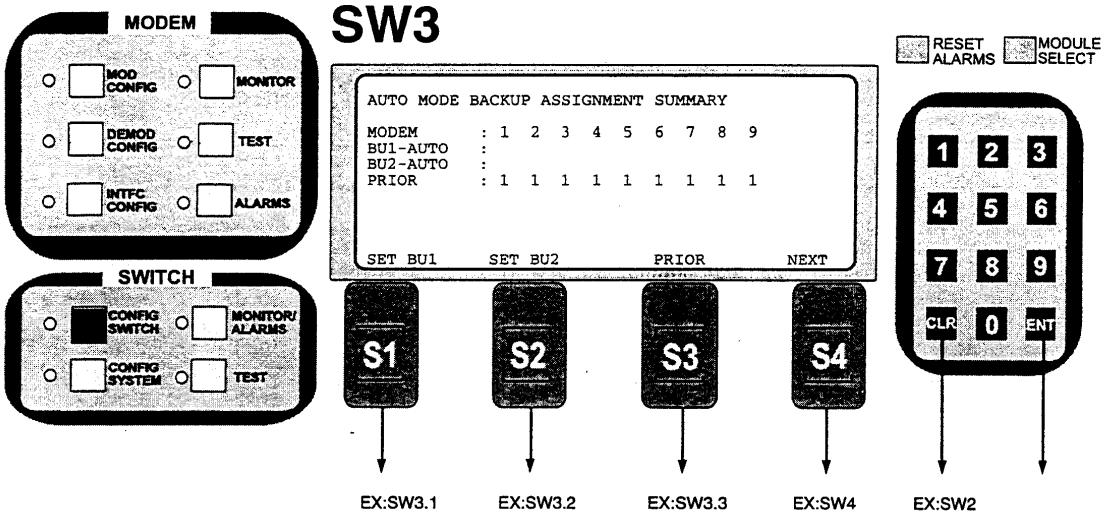
Popup error messages or error returns are also generated whenever commands to test a backup's capability to backup primes that are part of its backup pool. Possible errors are as follows:

MODEM_NOTPRESENT =	Modem not present
BACKUP_NOTPRESENT =	Backup modem not present
IOCARD_NOTPRESENT =	I/O card not present
MODEM_NOBACKUP =	Modem not part of a backup pool
MODEM_COMMERROR =	Backup modem communication error
MODEM_PARAMETER =	Backup modem is unable to backup prime. The return error in this case might be specific to the parameter in question
MODEM_CONFIGCHANGED =	Modem's configuration has changed

Popup error messages or error returns are also generated for the copy modem configuration command. Possible errors are as follows:

MODEM_NOTPRESENT =	Modem not present
IOCARD_NOTPRESENT =	I/O card not present
MODEM_COMMERROR =	Backup modem communication error
MODEM_PARAMETER =	Backup modem is unable to backup prime. The return error, in this case, might be specific to the parameter in question

NOTE: During backups, the switch uses the learned parameters of the primes it's attempting to backup. It is essential that the user learns the current configuration of the primes to guarantee user desired operation. The learned parameters are also used in the Backup Test and Copy features.



Notes:

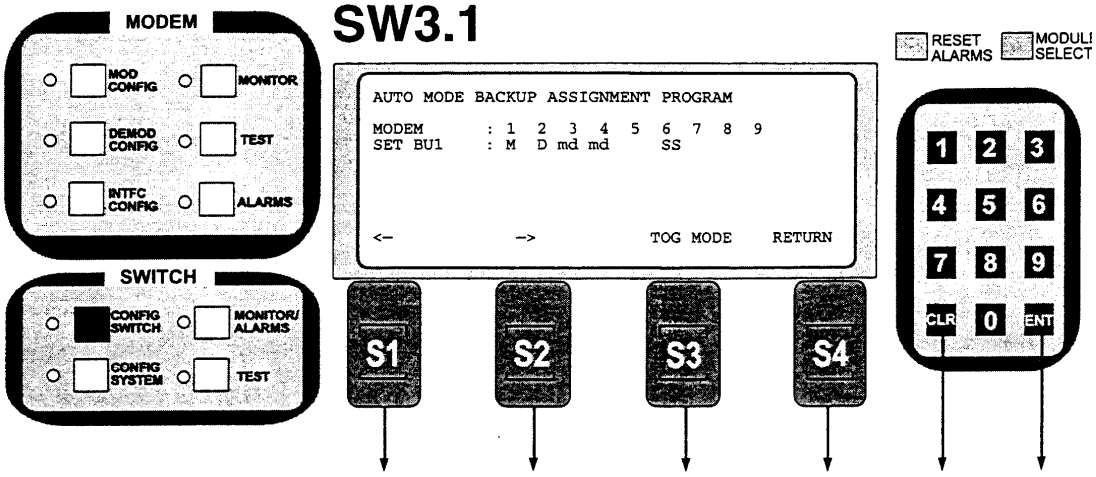
The RCS10 must be programmed with the prime channels used for automatic backup protection. There are up to two backup channels available and up to nine prime channels. For the above screen, the following letter codes indicate backup assignment information:

'M' - indicates a modulator is programmed for automatic backup and is currently in hot standby.
'D' - indicates a demodulator is programmed for automatic backup and is currently in hot standby.
'm' - indicates a modulator is programmed for automatic backup.
'd' - indicates a demodulator is programmed for automatic backup.
'B' - indicates a modulator or demodulator is currently backed up.
'S' - indicates a modulator or demodulator is in SERVCE MODE.
'*' - indicates a hot standby or backup is in progress.

Each line on the above screen summarizes auto backup assignment information, and is described below:

Programming Steps:

1. The 'MODEM' line on the display shows all of the prime channels available for protection. This line will display either the numbers 1 to 8 (if prime channel 9 is configured as a backup, then this line will display numbers 1 to 9).
2. The 'BU1-AUTO' line on the above display shows the prime channels that are programmed for automatic backup by backup channel 1. This line will have the label 'BU1-MANUAL' if backup channel 1 is configured for manual backup. Note that the automatic backup assignments can be programmed into the RCS10 while the backup channel is in manual mode; the auto backup assignments will then become active when the backup channel is placed into auto-revertive or auto-non-revertive backup mode. On the above display, prime channels 1 to 4 are programmed to backup channel 1, and prime channel 2 modulator and demodulator are presently backed up by backup channel 1.
3. The 'BU2-MANUAL line on the above display shows the prime channels that are programmed for automatic backup by backup channel 2. This line will have the label 'BU2-AUTO' if backup channel 2 is configured for auto-revertive or auto-non-revertive backup. On the above display, prime channels 5 to 8 are programmed to backup channel 2, and prime channel 5 modulator and demodulator are in hot standby.
4. The 'PRIOR' line on the above display shows the priority assignments for each prime channel. Priority numbers range from 1 to 9, with 1 being the highest priority and 9 being the lowest priority. Prime channels with the highest priority (1) assigned to a backup channel will be placed in hot standby by that backup channel. When 2 or more prime channels have the same highest priority, then the lowest channel number will be placed in hot standby. Priorities are also used during automatic revertive backups, if more prime channels are faulted then there are backups available, then the highest priority prime channels will be backed up and other priority failed prime channel will drop traffic. On the above display, all the prime channels are configured as highest priority, thus the lowest channel numbers determine hot standby.



EX:SW3 EX:SW3

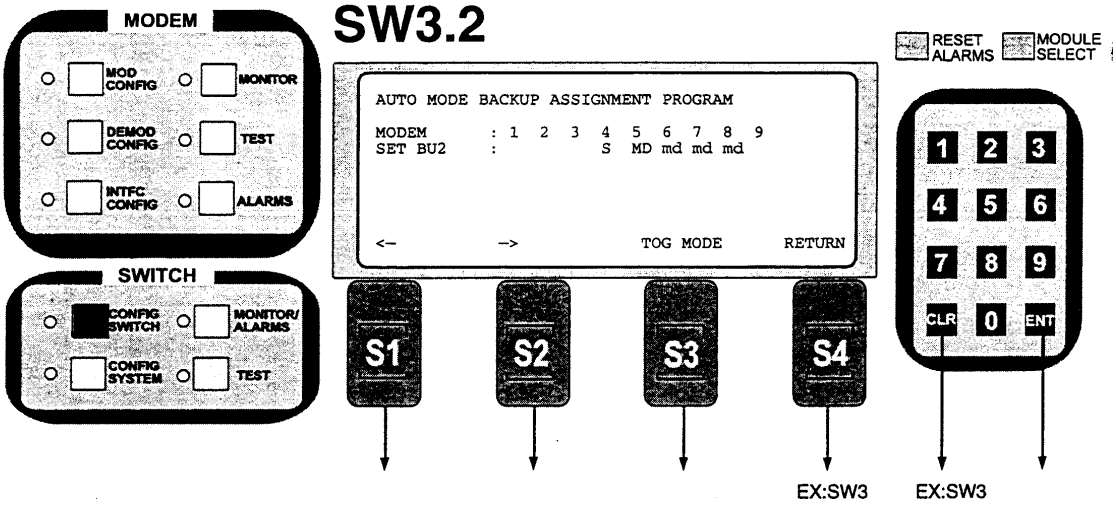
Notes:

This screen allows programming the RCS10 backup channel 1 to provide automatic switching for any or all of the prime channel modems. The following letter codes indicate backup assignment information for backup channel 1 on this screen:

'M' - indicates a modulator is programmed for automatic backup and is currently in hot standby.
'D' - indicates a demodulator is programmed for automatic backup and is currently in hot standby.
'm' - indicates a modulator is programmed for automatic backup.
'd' - indicates a demodulator is programmed for automatic backup.
'B' - indicates a modulator or demodulator is currently backed up.
'S' - indicates a modulator or demodulator is in SERVICE MODE.'
"*' - indicates a hot standby or backup is in progress.

The above screen shows that prime channel 1 modulator is in hot standby, prime channel 2 demodulator is in hot standby, and prime channels 3 and 4 have modulators and demodulators assigned to backup channel 1.

Programming steps:
1. Press <— or —> to move the flashing cursor the channel to be programmed
2. Press <TOG MODE> to switch from ' ' , to 'm', to 'd' to 'md' or vice-versa. The independent switching modes 'm' and 'd' will not be available if a channel is programmed for linked switching. (See Config Switch Screen 2). A blank (' ') indicates a prime channel is not assigned to backup 1, an 'm' indicates the modulator only is assigned to backup 1, a 'd' indicates the demodulator only is assigned to backup 1, and a 'md' indicates the modulator and demodulator is assigned to backup 1.
3. Select the desired backup 1 automatic backup assignments for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



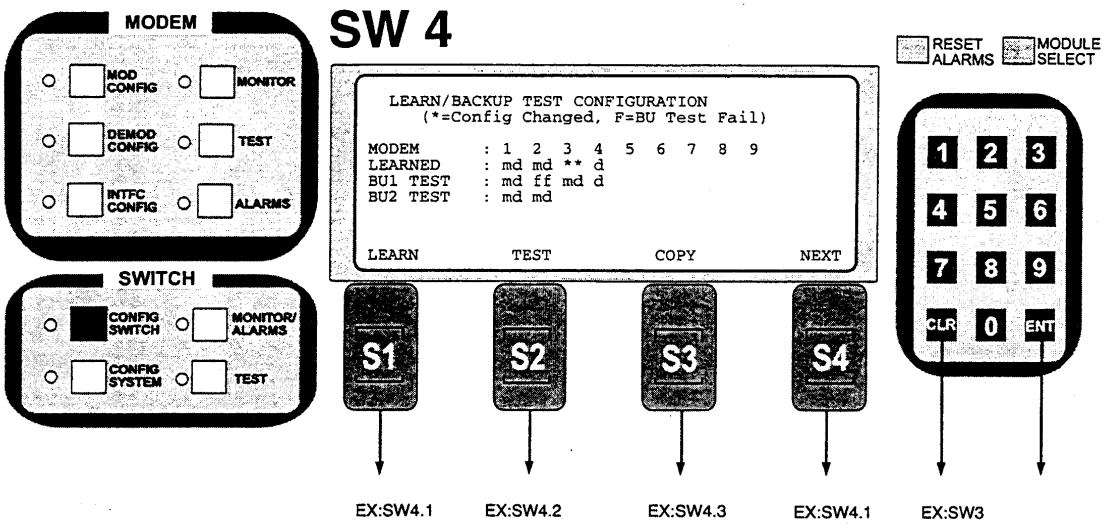
Notes:

This screen allows programming the RCS10 backup channel 2 to provide automatic switching for any or all of the prime channel modems. The following letter codes indicate backup assignment information for backup channel 2 on this screen:

'M' - indicates a modulator is programmed for automatic backup and is currently in hot standby.
'D' - indicates a demodulator is programmed for automatic backup and is currently in hot standby.
'm' - indicates a modulator is programmed for automatic backup.
'd' - indicates a demodulator is programmed for automatic backup.
'B' - indicates a modulator or demodulator is currently backed up.
'S' - indicates a modulator or demodulator is in 'SERVICE MODE.'
'*' - indicates a hot standby or backup is in progress.

The above screen shows that prime channel 5 modulator and demodulator are in 'Hot Standby' and prime channels 6 to 8 have modulators and demodulators assigned to backup channel 2.

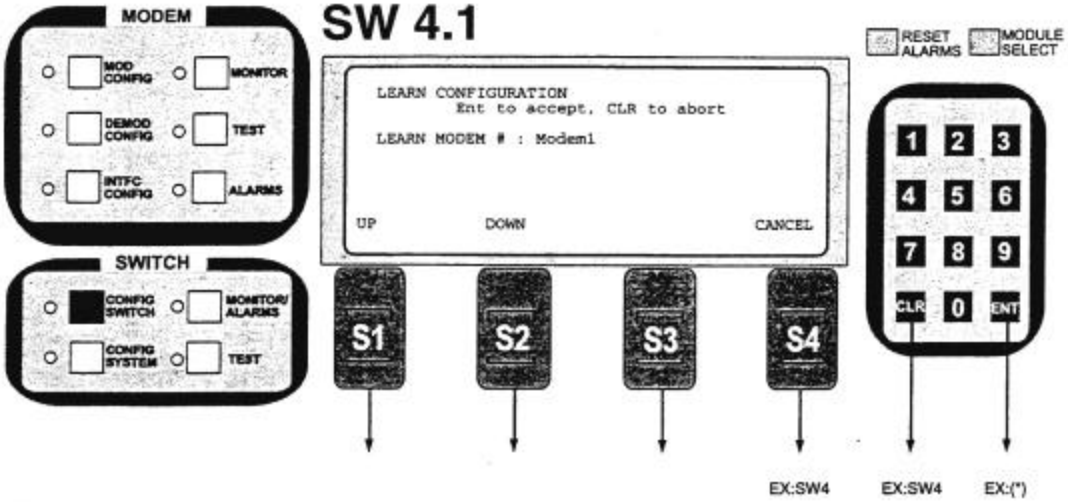
Programming steps:
1. Press <— or —> to move the flashing cursor the channel to be programmed
2. Press <TOG MODE> to switch from ' ', to 'm', to 'd' to 'md' or vice-versa. The independent switching modes 'm' and 'd' will not be available if a channel is programmed for linked switching (See Config Switch Screen 2). A blank (' ') indicates a prime channel is not assigned to backup 2, an 'm' indicates the modulator only is assigned to backup 2, a 'd' indicates the demodulator only is assigned to backup 2, and a 'md' indicates the modulator and demodulator is assigned to backup 2.
3. Select the desired backup 2 automatic backup assignments for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



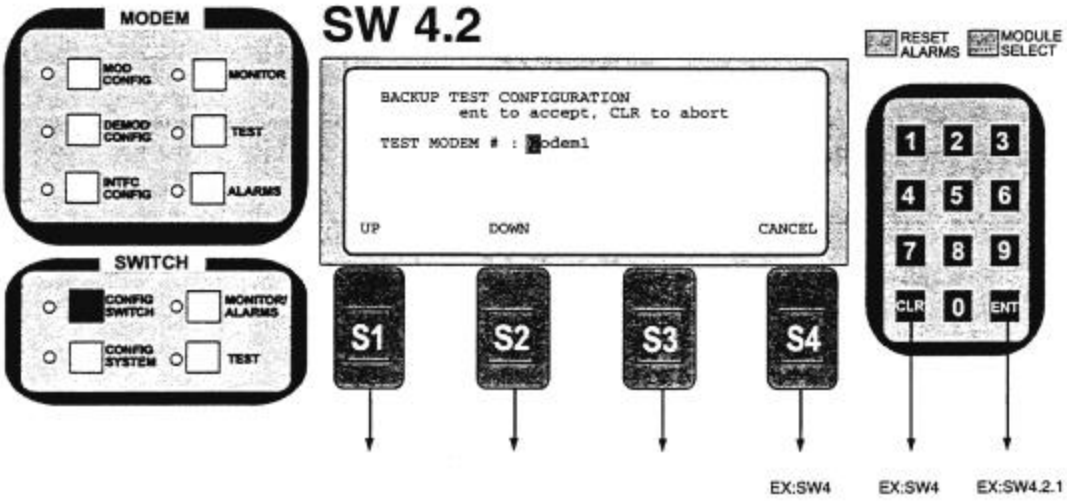
Notes:

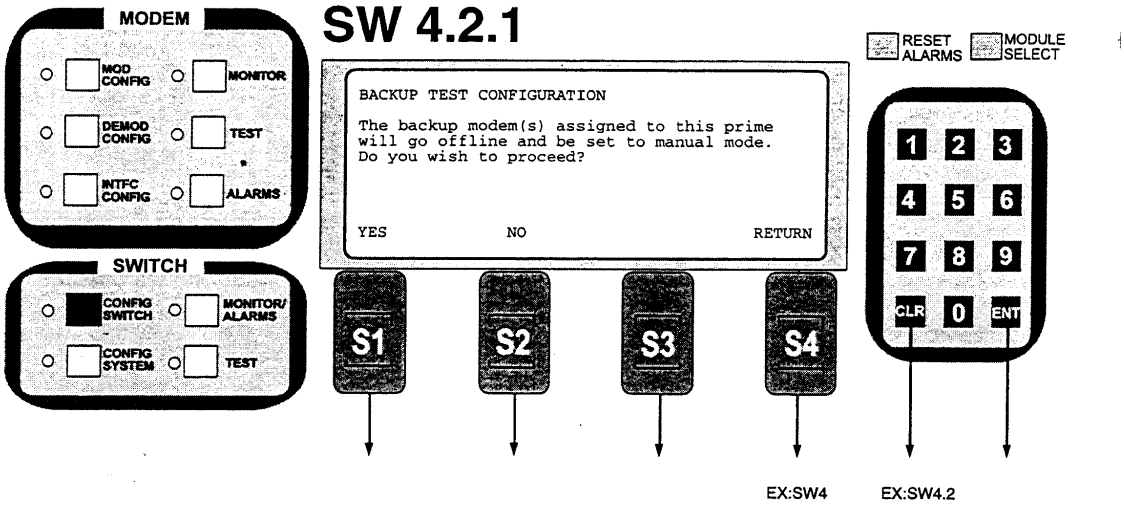
The Learn/Backup Test Configuration Screen letter codes mean the following:

'*' - Indicates a change in the prime's learned modulation or demodulation configuration.
'm' - For the LEARNED status line, it indicates that the configuration of a modulator programmed for automatic backup is learned. For the BUTEST status line, it indicates that a modulator's learned configuration is backup tested successfully.
'd' - For the LEARNED status line, it indicates that the configuration of a demodulator programmed for automatic backup is learned. For the BUTEST status line, it indicates that a demodulator's learned configuration is backup tested successfully.
'f' - The corresponding prime's learned configuration was backup tested and failed. BACKUP1 and/or BACKUP2 are unable to successfully backup the learned prime configuration. Example: In the above screen BACKUP1 is unable to backup Prime2 modem configuration. BACKUP2 can backup Prime2.

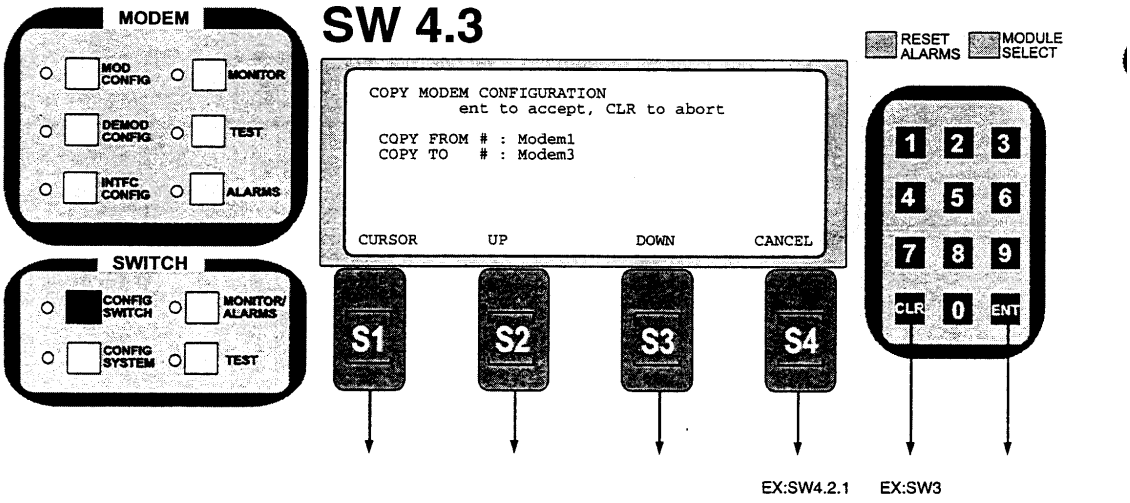


* Error popup screens will be displayed in case of failure





* Error popup screens will be displayed in case of failure



* Error popup screens will be displayed in case of failure

3.4.3 Service Mode

On occasion, it is necessary to remove a modem from the RCS10 chassis for service (hardware changes, firmware updates etc.) If the Switch is in Automatic Backup Mode, the modems must be placed in 'Service Mode' to remove it from the Backup Pool and stop a backup from taking place. To place a modem in Service Mode, press the front panel 'Config System' key and then press softkey 'S4' (Next) until the 'Modem Service Mode' screen is displayed. To modify a Modem Service selection, press softkey 'S1' (Service), and use the right and left arrows to highlight the modem to change and then press softkeu 'S3' (TOG MODE) to toggle the Modem Service selection. Finally, press the Enter key 'ENT' for the selection to take effect.

3.4.3 Interface Card (I/O) Configuration

Each Modem and I/O card in an RCS10 slot operates in sync. Each slot in the RCS-10 system consists of a DMD-10 modem and an IO card. The modem parameters are stored in non-volatile memory allowing the modem to return to its previous settings and configuration upon reset, power up, or hot insert. The I/O card parameters, on the other hand, are stored in the switch CPU card and are associated with the particular slot the I/O card is plugged into. This allows the newly inserted I/O card to match the operation of the modem already present in that particular slot. For instance, if an I/O card is moved from slot 2 to slot 4, it will get re-programmed with the saved parameters of slot 4. It is necessary for the user to make sure that the I/O card is programmed with the desired parameters. Reprogramming the overhead and the interface types is recommended and might be necessary.

Due to the nature of the RCS10 system whereas the DMD10 modems are completely independent of the interface cards, the channel's overhead parameters, both Mod and Demod, must be entered or reentered on initial setup of a channel. This is also true if a DMD10 modem is moved from one channel to another or if an interface card is moved from one channel to another. This can be done by either reentering the framing (96 Kb for IDR, 16/15 for IBS) or by reentering the mode setting (IDR or IBS) under both the Mod config. and Demod config.

When a prime is backed up, the backup modem uses the prime's I/O card to carry traffic. At times, the prime is placed in Service Mode, modified and reinserted into the RCS10 chassis. The user must not make any modifications to the interface card as it may cause interruptions in traffic. Some modem parameters such as Overhead, ESC Source and External EXC Source are relayed to the I/O card as well.

3.4.4 Modem/I/O/Switch Communications

The RCS10 Switch M&C periodically queries the Modems and I/O card for current configuration and status. upon power-up or hot insert, the I/O cards are initialized according to the parameters associated with the slot. In case of failure, the Switch M&C logs a descriptive event in the event log, sets a Minor Alarm, and asserts the appropriate faults. It will then periodically attempt to initialize the failed I/O card.

The Modem parameters on the other hand are saved in the Modem's non-volatile memory allowing the modem to return to its previous settings. The Switch periodically queries the modem for updates to its configuration. When a communication failure occurs, the Switch M&C takes the appropriate actions, but there are side-effects; the front panel updates seem sluggish and commands to the other Modems and I/O cards take longer to execute. The communication problems should be resolved for proper operation to resume. The 'MODEM CHANNEL CONNECTION TEST,' Alarm Status and Event Log should be used to help determine where the communication failure is occurring.

3.4.5 Configuration Copy

The Configuration Copy is a feature that enables a user to store/retrieve up to five modem and interface card configurations in non-volatile memory. These are in addition to the current running configuration.

The interface card configurations are tagged to the slot, and are stored in the switch. The modems, on the other hand hold their own settings. The user can copy from and copy to any configuration in memory including the current running configuration. Source and destination configurations must be different.

When instructed to copy a configuration, the switch sends a command to the modem to copy the configuration, and if successful, the switch updates the slot configurations as well. If the destination configuration is the current configuration, the modem re-initializes itself and uses the new settings. The switch interface card is only updated when the destination configuration is the current configuration.

A user must be careful not to copy onto the current configuration unless that is desired, or

disruptions in traffic will occur.

3.5 Modem Checkout and Initial Power-up

The following descriptions assume that the RCS10 is installed in a suitable location with AC power applied to both slide out power supplies.

NEVER apply power to the slide-out power supply modules unless they are firmly seated in the RCS10, as there is a potential shock hazard at the AC/DC converter within the module.

Turn the unit on by switching both AC power switches (located above the power entry connectors at the rear of the RCU10) to the 'ON' position. At power-up, the switch processor performs a self-diagnostic before beginning the primary monitor/control program. If a failure is detected during the power-up tests, the Major Alarm LED will illuminate. If there is no failure, there will be no indication on the front panel.

The initial field checkout of the switch can either be accomplished from the front panel or from a terminal connected to the Terminal Port. Using a terminal has the advantage of providing full screen access to all of the switch parameters, but requires a separate terminal or computer with terminal emulation software. If a terminal is used, the Terminal Port baud rate must first be set from the front panel.

NOTE: Upon power-up or 'Hot Insert' of the Universal Interface Modules (UIMs), the operator must set up the UIMs to the desired Interface Type. This can be accomplished by depressing the front panel 'INTFC CONFIG' key, selecting soft key '1' or '2' and then programming the applicable UIM interface type.

3.5.1 RCS10 Front Panel Data Entry Screens

Control from the front panel of the RCS10 is implemented through a series of data entry screens that are displayed on the front panel LCD. The screens are organized into groups of related parameters and status values. Within a single group, the screens are displayed on the LCD in a particular order; this order defines the 'menu tree' for that particular group of screens. Each menu tree is accessed by depressing one of the following keys on the RCS10 front panel:

MOD CONFIG, DEMOD CONFIG, INTFC CONFIG, MONITOR, TEST and *ALARMS* in the MODEM group, or *CONFIG SWITCH, CONFIG SYSTEM, MONITOR/ALARMS*, and *TEST* in the SWITCH group. For example, pressing the CONFIG SWITCH key causes CONFIG SWITCH SCREEN 0 – BACKUP MODE CONFIGURATION to be displayed on the LCD. The first screen of each menu tree is called the top level screen for that particular menu tree.

3.5.2 Basic Front Panel Controls

Once the top level screen for a particular menu tree is displayed, either the parameters on the screen can be edited, the next screen in the menu tree can be displayed, or the previous screen in the menu tree can be displayed. Each of these actions is discussed in detail below.

3.5.2.1 Changing Parameters from the Front Panel

Whenever there is a parameter that can be changed or edited from the front panel, the first character of the parameter value will highlight with a blinking box. This box is called the cursor, and the cursor defines what parameter is currently being edited. If there are several parameters on one screen, two of the softkeys will be labeled '<---' and '--->'. These keys are used to move the cursor from one parameter to the next, and therefore any of the configuration parameters displayed on the screen can be edited. The left arrow ('<---') moves the cursor to the left, and the right arrow

('--->') moves the cursor to the right. If the cursor is at the beginning or end of a row containing several parameters, the cursor will wrap to the opposite side of the display.

Editing a configuration parameter value is accomplished in one of several ways. If the parameter is numerical, the desired value should be entered from the numeric keys. Occasionally, the numeric values can be incremented and decremented by pressing softkeys labeled 'UP' and 'DOWN' respectively. In either case, when all of the numerical parameters have been edited to the desired values, pressing the ENTER key will execute a load of the parameters into memory, and then advance to the next screen in the menu tree. Pressing the CLEAR key will *not* execute a load of parameters into memory (the original parameter values before editing will be retained), and then move to the previous screen in the menu tree.

If a parameter has a non-numeric value, the allowed values for that parameter can be edited by pressing softkeys with the desired values. In cases where there are multiple parameters shown on a screen, the values are edited with the softkeys and loaded by pressing the ENTER key, which also advances to the next screen in the menu tree. Pressing the softkey labeled 'NEXT' or 'PREVIOUS' will abort loading the parameters into memory, and advance to the appropriate screen. In cases where there is a single parameter shown on a screen, pressing the softkey labeled with the desired value will immediately load the parameter into memory. In this case, the parameter load can be aborted by pressing the CLEAR key, which will return to the previous screen, or by pressing the softkey labeled 'NEXT', which will advance to the next screen in the menu tree and so on.

3.5.2.2 Moving to the Next Screen in a Menu Tree

If the user desires to advance to the next screen in the menu tree, the softkey labeled 'NEXT' should be pressed. Some submenu screens can only return to a previous screen, in this case a softkey will be labeled 'RETURN'. In either case, if any numerical parameters are being edited, the values will *not* be loaded into memory. When the last screen of a menu tree is reached, advancing to the next screen will wrap to the first screen of the menu tree.

3.5.2.3 Moving to the Previous Screen in a Menu Tree

If the user desires to advance to the previous screen in the menu tree, the CLEAR key should be pressed. If any numerical parameters are being edited, the values will *not* be loaded into memory. If the clear key is pressed while the first screen of a menu tree is displayed, the previous screen will wrap to the last screen in the menu tree.

3.6 Summary of Basic Front Panel Controls

Shown below is a table describing the functionality of the front panel keyboard in relation to front panel control:

ENTER	Loads edited values into memory and advances to next screen in the menu tree.
CLEAR	Aborts loading values into memory and moves to the previous screen in the menu tree.
NEXT (softkey)	Aborts loading values into memory and moves to the next screen in the menu tree.
PREVIOUS (softkey)	Aborts loading values into memory and moves to the previous screen in the menu tree.
Numeric Keys	Used to edit numeric parameters.

3.7 DMD10 Modem Strap Codes (Quick Set Keys)

The Strap Code is a quick set key that conveniently sets many of the modem parameters. For quick setup of the DMD10, Strap Codes are very helpful. When a Strap Code is entered,

the modem will be configured for the code's corresponding data rate, overhead, code rate, framing, scrambler type and modulation. Refer to Table 3-2 below for a listing of the available RCS10 Strap Codes.

NOTE: The Strap Codes are only used to configure the Modems with the predefined settings. It might be necessary to reconfigure the Modem's associated I/O Card, Overhead, Interface type etc., for the system to operate properly.

Table 3-2. RCS10 Quick Set Keys

Strap Code (DEC)	Data Rate (Kbps)	Overhead	Code Rate	Framing	Scrambler	Drop and Insert	Reed-Solomon	Modu-lation
1	64	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
2	128	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
3	256	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
5	384	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
6	512	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
9	768	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
4	1536	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
10	1920	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
8	2048	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
12	2048	1*	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
17	64	0	3/4	IDR	V.35 (IESS)	DISABLE	DISABLE	QPSK
18	192	0	3/4	IDR	V.35 (IESS)	DISABLE	DISABLE	QPSK
20	384	0	3/4	IDR	V.35 (IESS)	DISABLE	DISABLE	QPSK
16	**1544**	**96K**	**3/4**	**IDR**	**V.35 (IESS)**	**DISABLE**	**DISABLE**	**QPSK**
32	2048	96K	3/4	IDR	V.35 (IESS)	DISABLE	DISABLE	QPSK
64	6312	96K	3/4	IDR	V.35 (IESS)	DISABLE	DISABLE	QPSK
128	8448	96K	3/4	IDR	V.35 (IESS)	DISABLE	DISABLE	QPSK
24	56	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
33	56	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
34	64	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
36	64	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
40	128	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
48	128	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
65	256	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
66	256	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK

68	320	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
72	320	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
80	384	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
96	384	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
129	512	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
130	512	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
132	768	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
136	768	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
144	896	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
44	896	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
7	1344	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
11	1344	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
13	1536	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
14	1536	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
19	1544	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
21	1544	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
22	1920	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
25	1920	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
26	2048	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
28	2048	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
37	2368	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
38	2368	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
41	48	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
49	48	64/45	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
50	56	128/105	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
160	1544	3072/2895	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
52	1920	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
69	6312	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
70	8448	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
73	3152	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
74	3152	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
76	3264	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
81	3264	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
88	512	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK

97	1024	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
98	1024	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
112	64	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
131	128	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
133	256	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
134	192	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
137	192	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
138	320	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
140	320	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
145	384	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
100	448	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
146	448	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
104	576	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
148	576	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
152	640	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
161	640	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
162	704	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
164	704	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
168	768	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
+193	832	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
194	832	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
196	896	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
208	896	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
224	960	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
15	960	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
23	1024	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
27	1024	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
29	1536	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
30	1088	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
39	1088	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
43	1152	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
46	1152	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
51	1216	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
53	1216	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK

54	1280	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
57	1280	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
58	1344	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
67	1408	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
71	1408	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
75	1472	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
77	1472	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
78	1600	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
83	1600	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
85	1664	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
86	1664	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
89	1728	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
90	1728	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
92	1792	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
99	1792	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
101	2048	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
102	1856	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
105	1856	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
106	2048	1*	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
113	48	64/45	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
114	56	128/105	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
120	1544	3072/2095	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
135	1984	16/15	1/2	IBS	IBS	DISABLE	DISABLE	QPSK
139	1984	16/15	3/4	IBS	IBS	DISABLE	DISABLE	QPSK
45	3088	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
141	3088	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
176	4000	1	1/2	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK
116	4000	1	3/4	CNT	V.35 (IESS)	DISABLE	DISABLE	QPSK

3.8 RCS10 Sample Operation Examples

The following examples are designed to show the operator various configuration setups while becoming familiar with the structure of the RCS10 operational menus.

a. To set the RCS10 for Drop and Insert Operation, perform the following:

- Press 'MODULE SELECT' button and enter modem number to setup.
- Press ''MOD CONFIG' button.

- Press 'DATA RATE' soft key.

- Press 0 5 1 2

- Press 'ENT' button. (You have now selected a data rate of 512 Kbps).

The modem will now ask “Do you want the transmitter turned back on” Select Yes or No as desired.

- Press 'MODE' soft key.

- Press 'DRP & I' soft key.

The modem will now ask if you want the transmitter turned back on. Select Yes or No as desired.

- Press 'DEMOD CONFIG' button.

- Press 'DATA RATE' soft key.

- Press 0-5-1-2

- Press 'ENT' button. (You have now selected a data rate of 512 Kbps).

- Press 'MODE' soft key.

- Press 'DRP & I' soft key.

- Press 'INTF CONFIG' button.

- Press 'NEXT' soft key.

- Press 'TX TYPE' soft key.

- Press 'UP' or 'DOWN' soft key repeatedly to scroll through the interface formats until G.703.U.E1 appears.

- Press 'ENT' button.

- Press 'RX TYPE' soft key.

- Press 'UP' or 'DOWN' soft key repeatedly to scroll through the interface formats until G.703.U.E1 appears.

- Press 'ENT' button.

- Press 'NEXT' soft key until you get to the display where you can change the 'TX D&I MODE'.

- Press 'MODE' soft key.

- Press 'MORE' soft key.

- Press 'PCM-30' soft key.

The modem will now ask if you want the transmitter turned back on. Select Yes or No as desired.

- Press 'NEXT' soft key.

- Press 'MODE' soft key.

- Press 'MORE' soft key.

- Press 'PCM-30' soft key.

- Press 'NEXT' soft key until you get to the display where you can change the 'T1E1 FRAME SOURCE'.

- Press 'T1E1' soft key.

- Press 'EXTERNAL' soft key. (The modem will automatically select buffer clock source to

EXTEXC and the EXTEXC source to IDI since these are required modes to run EXTERNAL FRAMING).

- Press 'NEXT' soft key until you get to the display where you can set 'TX D&I MAPPING'.
- Press 'COPY' soft key.
- Press 'UP' or 'DOWN' soft key until 'ROM8' is displayed.
- Press 'CURSOR' soft key.
- Press 'UP' or 'DOWN' soft key until 'TX EDIT' is displayed.
- Press 'ENT' button.
- Press 'COPY' soft key.
- Press 'UP' or 'DOWN' soft key until 'TX EDIT' is displayed.
- Press 'CURSOR' soft key.
- Press 'UP' or 'DOWN' soft key until 'TX ACTIVE' is displayed.
- Press 'ENT' button.
- Press 'NEXT' soft key. (See RX D&I MAPPING).
- Press 'COPY' soft key.
- Press 'UP' or 'DOWN' soft key until 'ROM8" is displayed.
- Press 'CURSOR' soft key.
- Press 'UP' or 'DOWN' soft key until 'RX EDIT' is displayed.
- Press 'ENT' button.
- Press 'COPY' soft key.
- Press 'UP' or 'DOWN' soft key until 'RX EDIT" is displayed.
- Press 'CURSOR' soft key.
- Press 'UP' or 'DOWN' soft key until 'RX ACTIVE' is displayed.
- Press 'ENT' button.

These settings load slot 1 with channel 1, 2 etc. To set specific Terrestrial time slot to a specific TX Sat Ch, you would use 'EDIT' soft key.

b. Set RCS10 as follows to force a manual backup from prime #4 to backup #1:

- Press 'CONFIG SW' button.
- If BACKUP1 MODE: MANUAL you may skip the setting of manual.
    - Press 'BU1 MODE' soft key to select BACKUP #1.
    - Press 'MANUAL' soft key to place BACKUP #1 in MANUAL mode.
- Press 'NEXT' soft key until you reach 'MODEM SWITCHING STYLE' display.
- Press '<---' or '--->' soft key until 4 is highlighted.
- Press 'TOG MODE' soft key until modem 4 shows a 'U' (Unit or dependent switching).
- Press 'ENT' button.
- Press 'NEXT' soft key until 'FORCE MANUAL BACKUP' display appears.
- Press 'SET BU1' softkey.

- Press '4'.

- Press 'ENT' button.

c. Set RCS10 as follows to force a manual backup from Prime #2 DEMOD to Backup #2.

- Press 'CONFIG SW' button.

- If BACKUP2 MODE: MANUAL you may skip the setting of manual.

    - Press 'BU2 MODE' soft key to select BACKUP #2.

    - Press 'MANUAL' soft key to place BACKUP #2 in MANUAL mode.

- Press 'NEXT' soft key until you reach 'MODEM SWITCHING STYLE' display.

- Press '<---' or '--->' soft key until 2 is highlighted.

- Press 'TOG MODE' soft key until modem 2 shows a 'M' (Module or independent switching).

- Press 'ENT' button.

- Press 'NEXT' soft key until 'FORCE MANUAL BACKUP' display appears.

- Press 'SET BU2' softkey.

- Press 'DEMOD'.

- Press '2'.

- Press 'ENT' button.

d. Set RCS10 as follows to select 2:8 operation covering all modems with both backups:

- Press 'CONFIG SW' button.

- Press 'BU1 MODE' soft key.

- Press 'REVERTIVE' soft key. (Non-revertive could be selected as well if desired).

- Press 'BU2 MODE' soft key.

- Press 'REVERTIVE' soft key. (Non-revertive could be selected as wel lif desired).

- Press 'NEXT' soft key until 'AUTO B.U. ASSIGNMENT SUMMARY' appears on display.

- Press 'SET BU1' soft key.

- Press '<---' or '--->' softkey to move through the modems and press 'TOG MODE' softkey until all show 'md'.

- Press 'ENT' button.

- Press 'SET BU2' soft key.

- Press '<---' or '--->' softkey to move through the modems and press 'TOG MODE' softkey until all show 'md'.

- Press 'ENT' button.

- You may at this point set desired priorities for the modems using the 'PRIOR' soft key.

- Press the 'NEXT' soft key.

- Press 0, 0, 5 (5 seconds) and '--->' soft key and continue until all modems are set for a 5 second failure delay before backup.

- Press 'ENT' button.

- Press 0, 0, 5 (5 seconds) and '--->' soft key and continue until all modems are set for a 5 second failure delay before backup.

- Press 'ENT' button.

e. Set RCS10 as follows to select two 1:N systems with one modem being covered by both backups:

- Press 'CONFIG SW' button.

- Press 'BU1 MODE' soft key.

- Press 'REVERTIVE' soft key. (Non-revertive could be selected as well if desired).

- Press 'BU2 MODE' soft key.

- Press 'REVERTIVE' soft key. (Non-revertive could be selected as well if desired).

- Press 'NEXT' soft key until 'AUTO B.U. ASSIGNMENT SUMMARY' appears on display.

- Press 'SET BU1' soft key.

- Press '<---' or '--->' softkey to move through the modems and press 'TOG MODE' softkey until modems 1, 2, 5, 6, 7, 8 show 'md'.

- Press 'ENT' button.

- Press 'SET BU2' soft key.

- Press '<---' or '--->' softkey to move through the modems and press 'TOG MODE' softkey until modems 3, 4, 7 show 'md'.

- Press 'ENT' button.

The following display should appear:

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
BU1	md	md			md	md	md	md
BU2			md	md			md	
PRIORITY	2	3	3	2	6	5	1	4

- You may at this point set desired priorities for the modems using the 'PRIOR' soft key.

- Press the 'NEXT' soft key.

- Press 0, 0, 5 (5 seconds) and '--->' soft key and continue until all modems are set for a 5 second failure delay before backup.

- Press 'ENT' button.

- Press 0, 0, 5 (5 seconds) and '--->' soft key and continue until all modems are set for a 5 second failure delay before backup.

- Press 'ENT' button.

f. To inject faults for testing Automatic Backup, or to force an Auto Backup of a modem,

perform the following:

- Press 'TEST' button that is grouped with 'MODEM' functions.

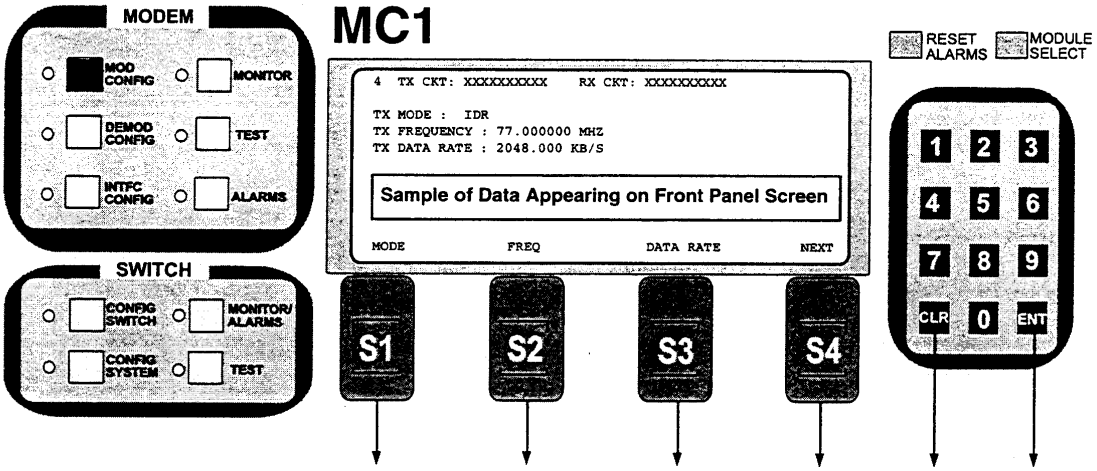
- Press 'NEXT' soft key until you arrive at the 'INJECT MOD + DMOD SUMMARY FAULT' display.

You can inject Mod and/or Demod faults to cause dependent or independent switching (depending on setup).

You can select different modems from this menu by using the 'MODULE SELECT' button.

3.9 RCS10 Command and Status Parameters (Front Panel Menu Screens)

The following illustrations provide the Command and Status parameters that are available to the operator from the front panel of the RCS10. Each of the functional areas of the RCS10 will be represented by an abbreviation and screen number. The abbreviations shown below will apply:



3.9.1 Function Keys

Below the function keys shown above (S1, S2, S3, S4, CLR and ENT), will appear alphanumeric references to the screens that will be accessed when that particular button is depressed. The abbreviation list below is a guide to the particular screen area that is being accessed. If no alphanumeric reference appears below a function key, no action will be performed when it is depressed on the RCS10. Also, below the function keys may appear additional helpful information on moving cursors, increasing/decreasing values etc.

NOTE: EX = Execute the command, AB = Abort the Command.

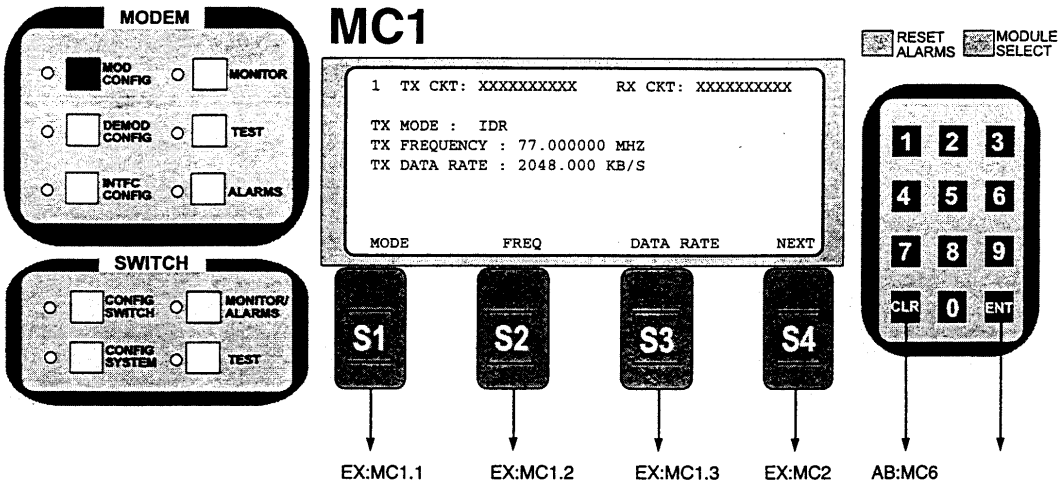
Key to Front Panel Abbreviations

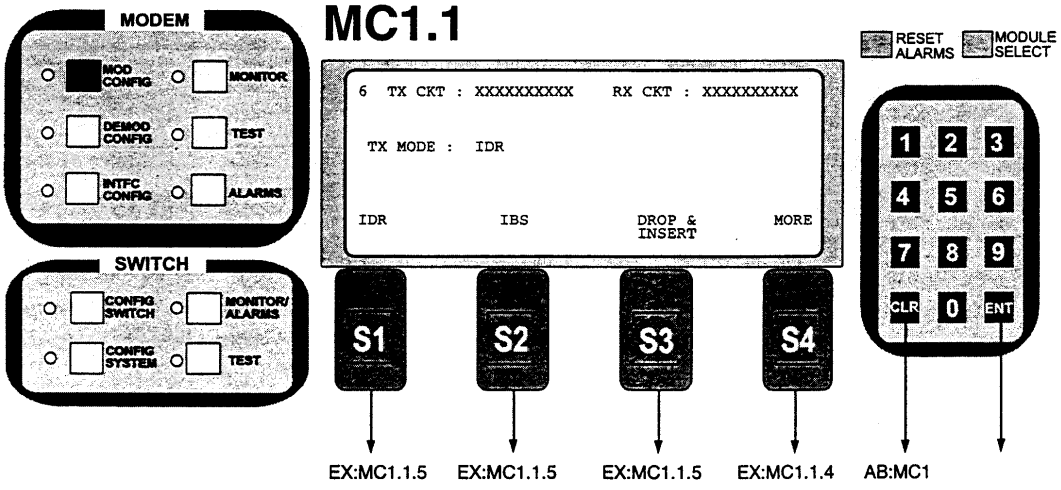
MODEM Section

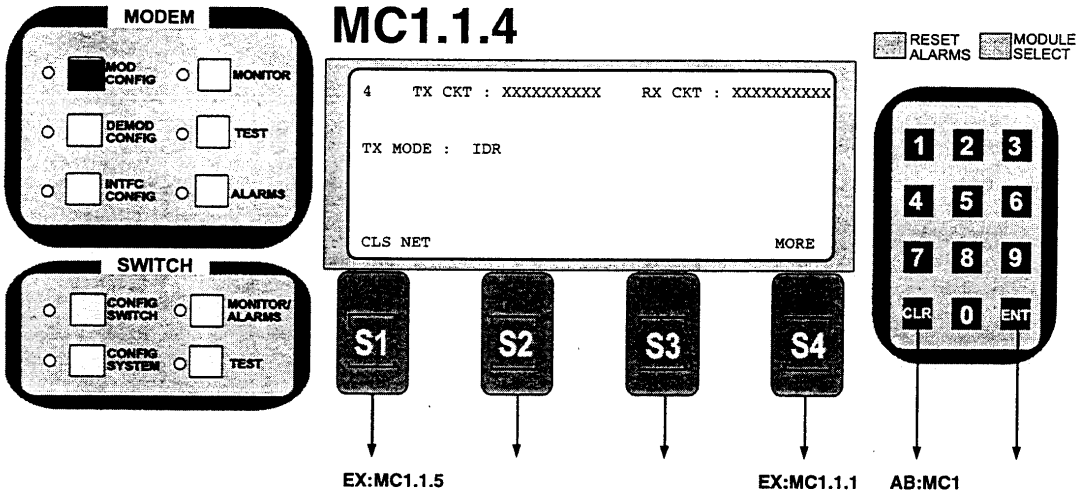
MC = Modulator Configuration (MOD CONFIG)
DC = Demodulator Configuration (DEMOD CONFIG)
IC = Interface Configuration (INTFC CONFIG)
MON = Modem Monitor (MONITOR)
MT = Modem Test (TEST)
MA = Modem Alarms (ALARM)

SWITCH Section

SW = Switch Configuration (CONFIG SWITCH)
SYS = System Configuration (CONFIG SYSTEM)
MA = Switch Monitor and Alarms (MONITOR/ALARMS)
TEST = Switch Test Function (Currently Not Available)


MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
MC1
1 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
TX MODE : IDR
TX FREQUENCY : 77.000000 MHZ
TX DATA RATE : 2048.000 KB/S
MODE FREQ DATA RATE NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:MC1.1
EX:MC1.2
EX:MC1.3
EX:MC2
AB:MC6


MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
MC1.1
6 TX CKT : XXXXXXXXXX RX CKT : XXXXXXXXXX
TX MODE : IDR
IDR IBS DROP & INSERT MORE
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:MC1.1.5
EX:MC1.1.5
EX:MC1.1.5
EX:MC1.1.4
AB:MC1



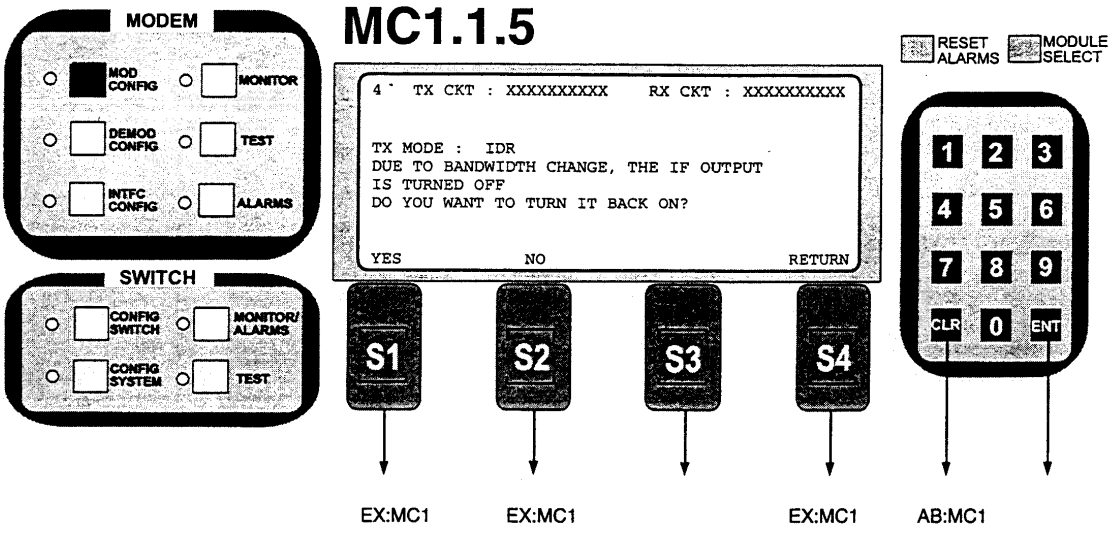
TX Mode – The mode command sets a number of parameters within the modem to meet a set specification. The purpose is to eliminate keystrokes and potential compatibility problems. Additionally, data rates not covered by the given mode of operation will not be allowed. If the mode of operation is selected after the data rate has been entered, then the data rate must be compatible with the desired mode of operation or the mode will not be allowed. The following parameters are set for the given mode of operation and cannot be changed while the unit is in the given mode of operation:

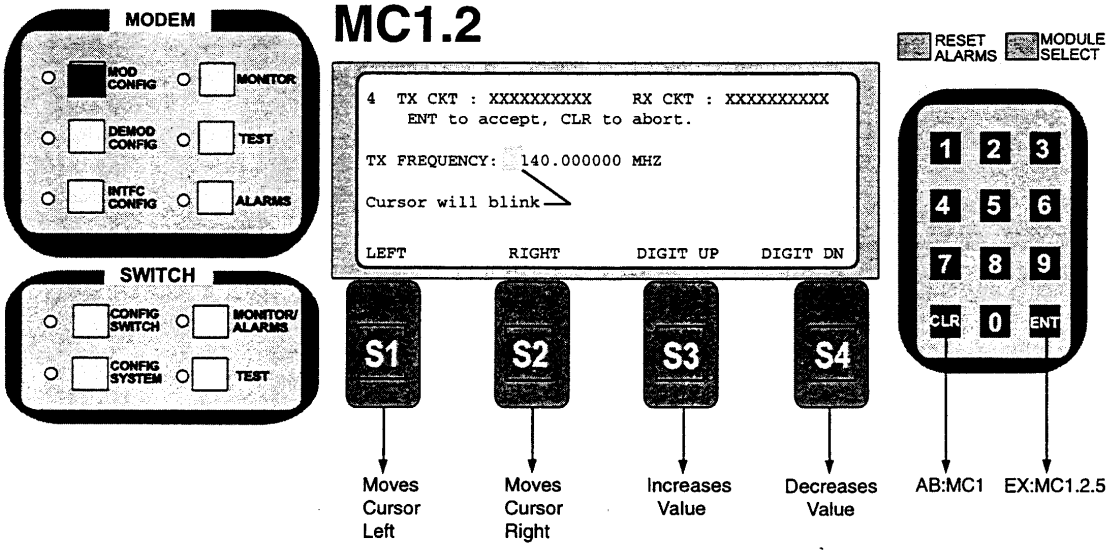
IDR Mode: (IESS-308)
Data rates: 1.544, 2.048, 6.312, 8.448 Mbps
Framing Type: 96 KB/S (IDR)
Scrambler type: V.35
Spectrum Mask: Intelsat
Framing Type: 16/15 (IBS)
Scrambler Type: IESS-309
Spectrum Mask: Intelsat

IBS Mode: (IESS-309)
Data Rates: 2048 and below
Framing Type: 16/15 (IBS)
Scrambler Type: IESS-309
Spectrum Mask: Intelsat

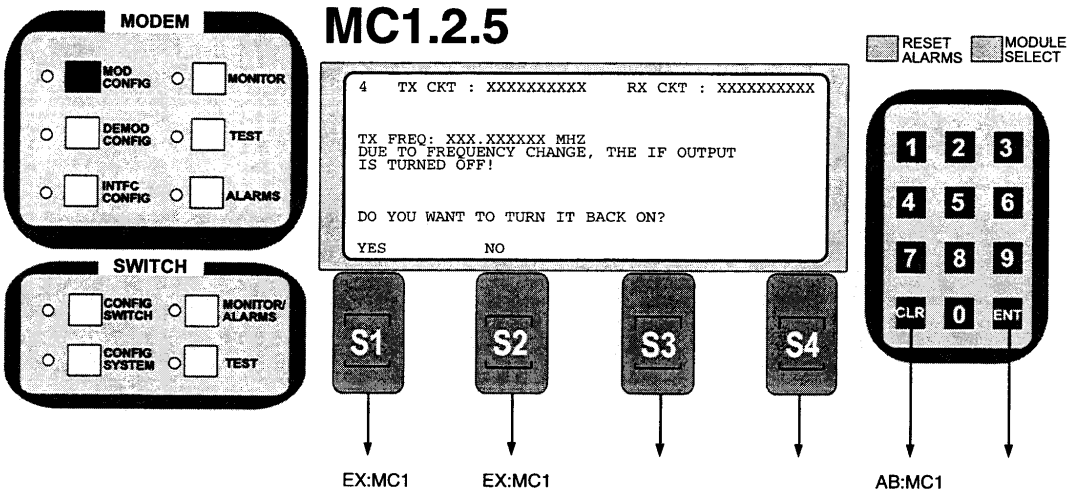
Drop & Insert:
Data Rates: n x 64 n =1, 2, 3, 4, 5, 6, 8, 10,12, 15, 16, 20, 24, 30
Framing Type: 16/15 (IBS)
Scrambler Type: IESS-309
Spectrum Mask: Intelsat

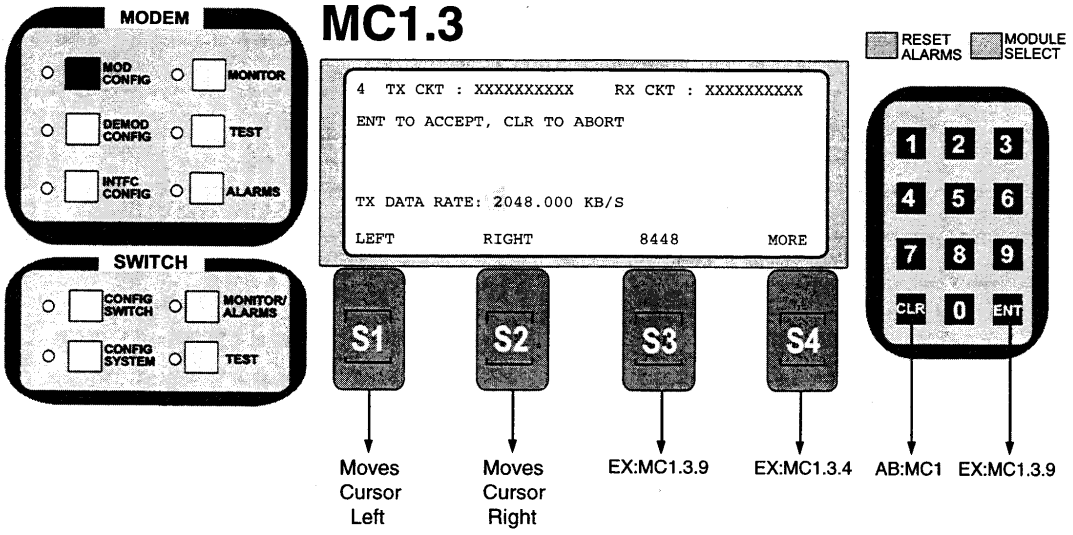
Closed Net: All possible combinations allowed



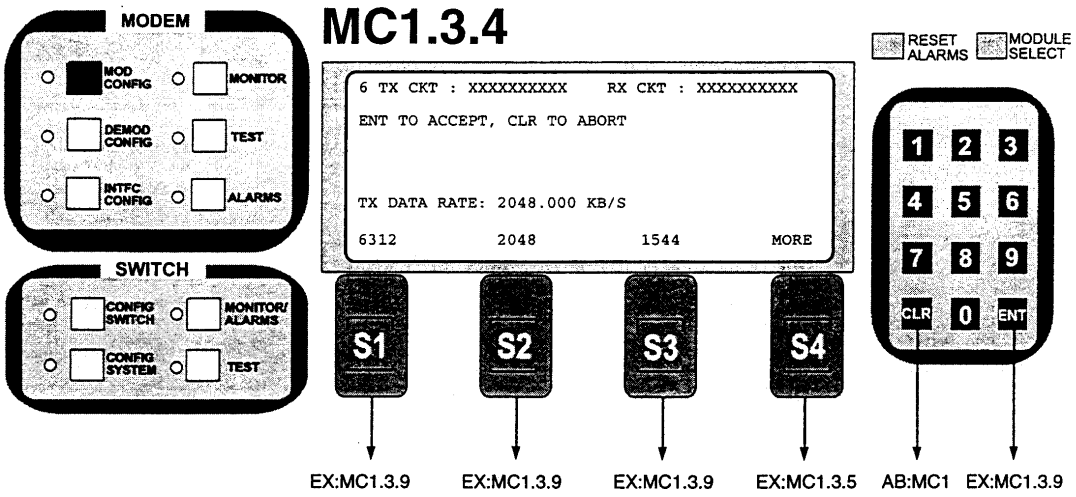


Note: Valid frequency range is 50-90 MHz and 100-180 MHz in 1 Hz increments. Value may be entered using keypad digits. Hit ENT any time -- value displayed will be programmed.

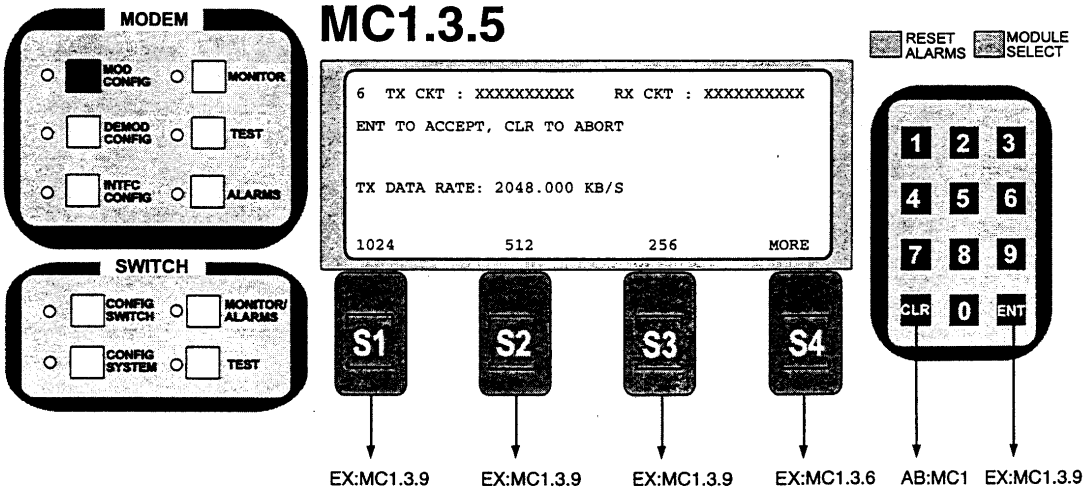




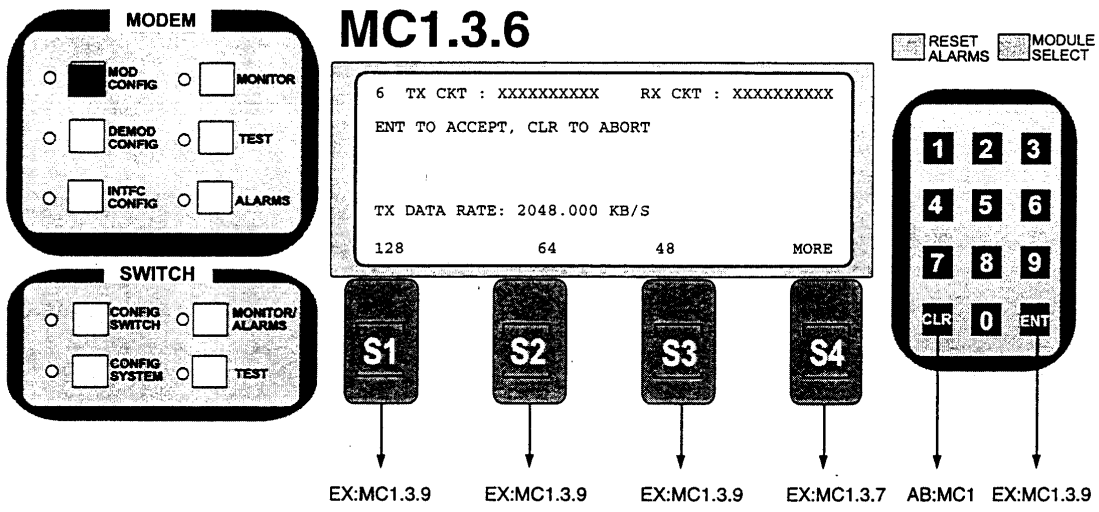
Note: Data rate in bit-per-second steps. Value may be entered using keypad digits. Hit ENT at any time -- value displayed will be programmed.



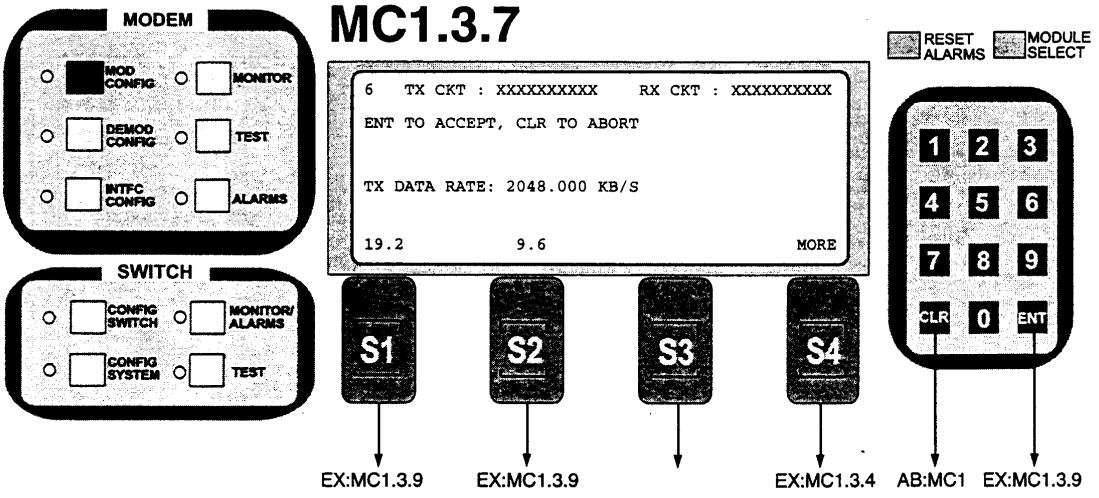
Note: Data rate in bit-per-second steps. Value may be entered using keypad digits. Hit ENT at any time -- value displayed will be programmed.



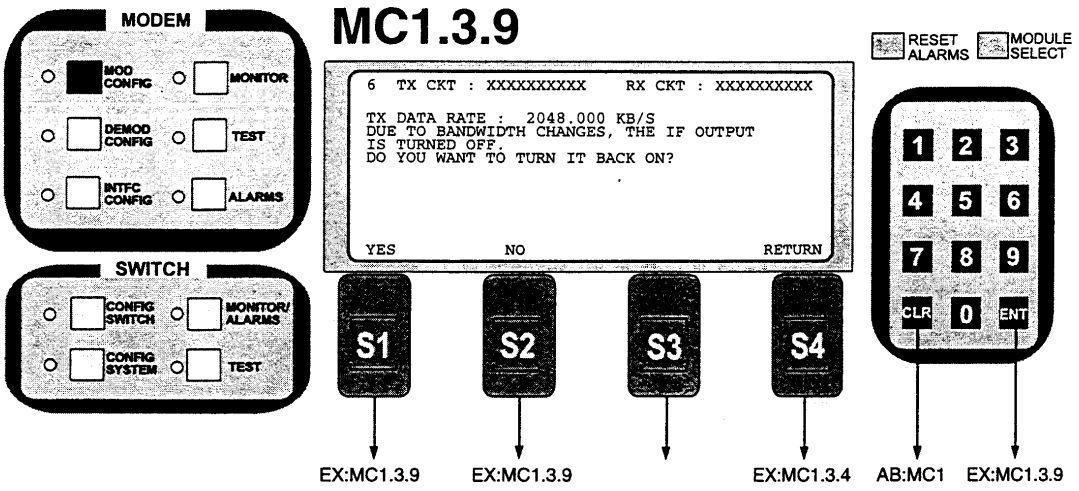
Note: Data rate in bit-per-second steps. Value may be entered using keypad digits. Hit ENT at any time -- value displayed will be programmed.



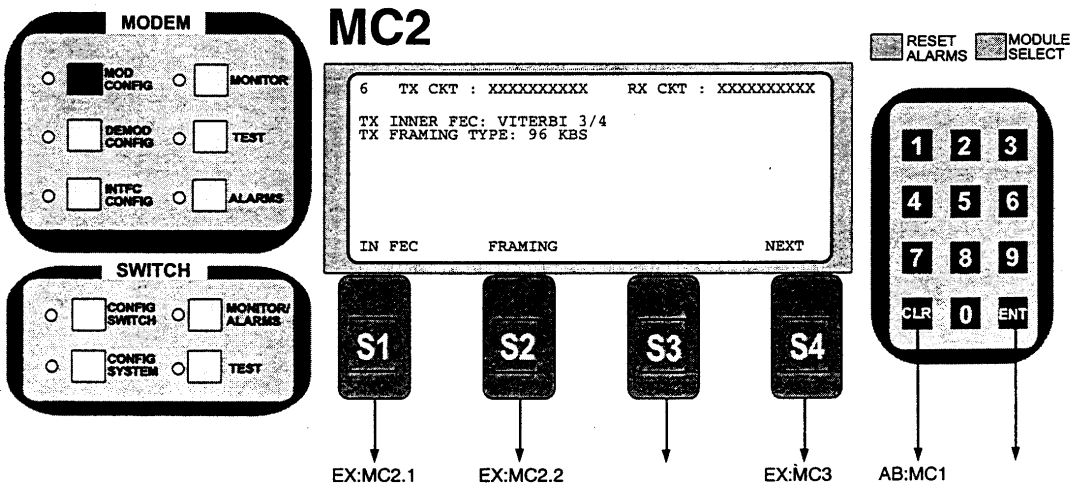
Note: Data rate in bit-per-second steps. Value may be entered using keypad digits. Hit ENT at any time -- value displayed will be programmed.

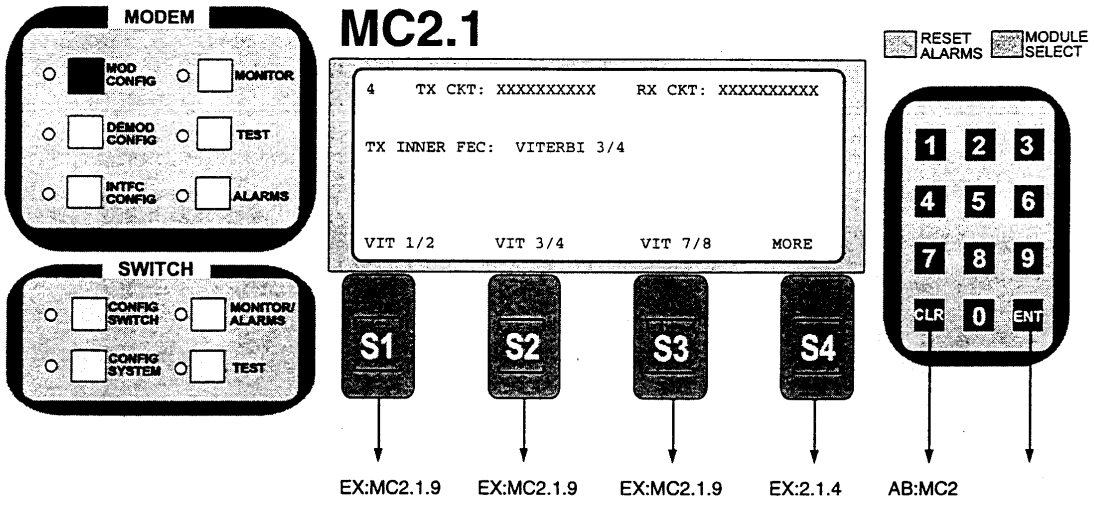


Note: Data rate in bit-per-second steps. Value may be entered using keypad digits. Hit ENT at any time -- value displayed will be programmed.

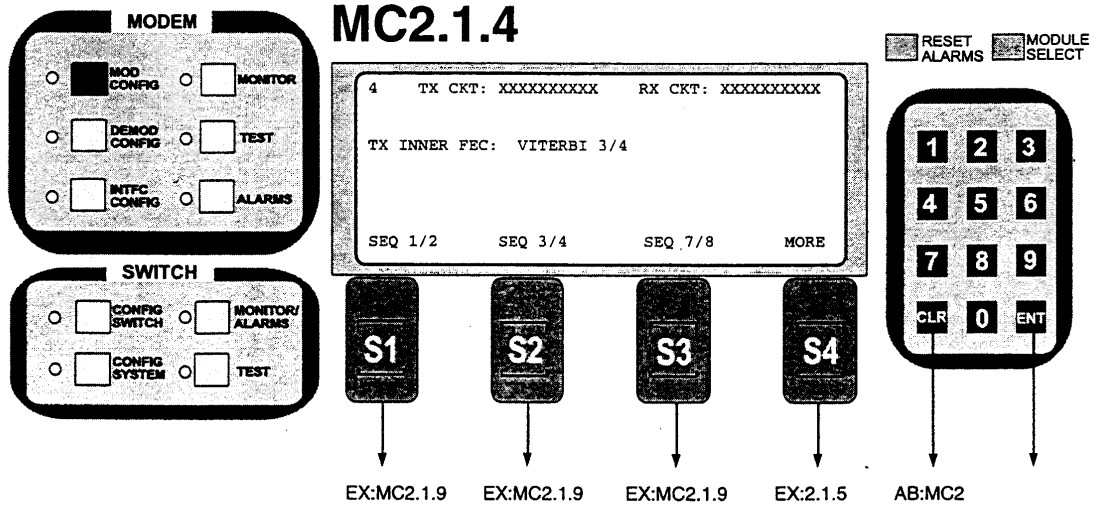


Note: Destination of executed YES depends upon which option was selected.

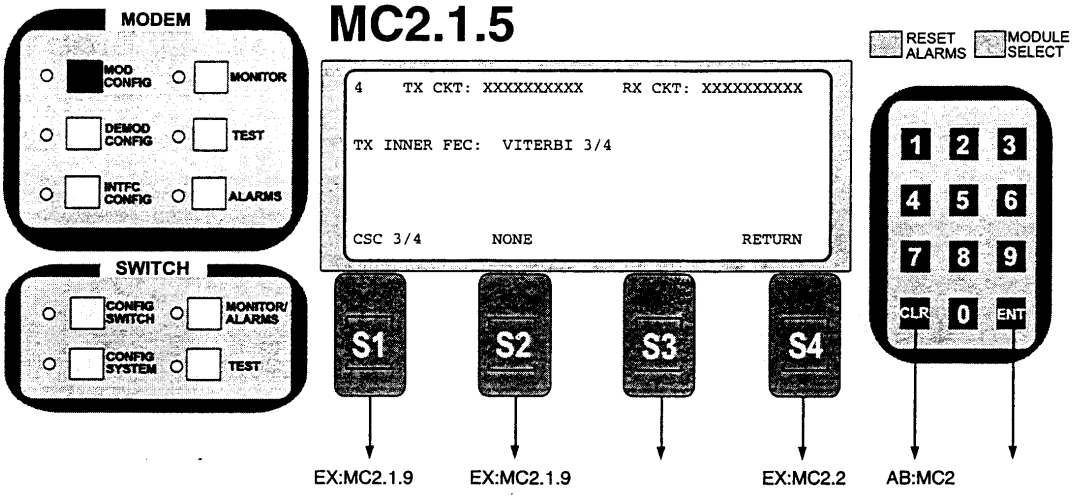




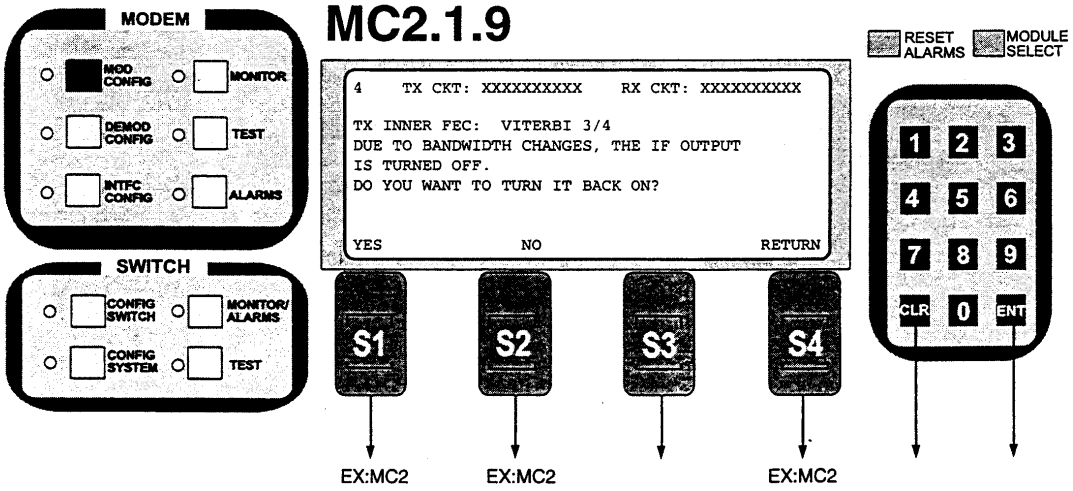
NOTE: Inner FEC -- Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE
CSC3/4 = ComStream Sequential 3/4 Compatible

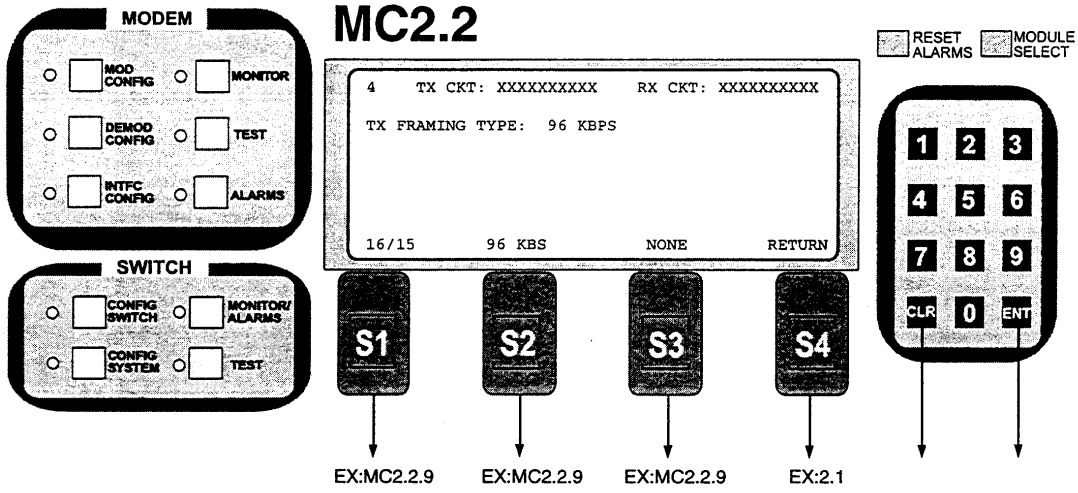


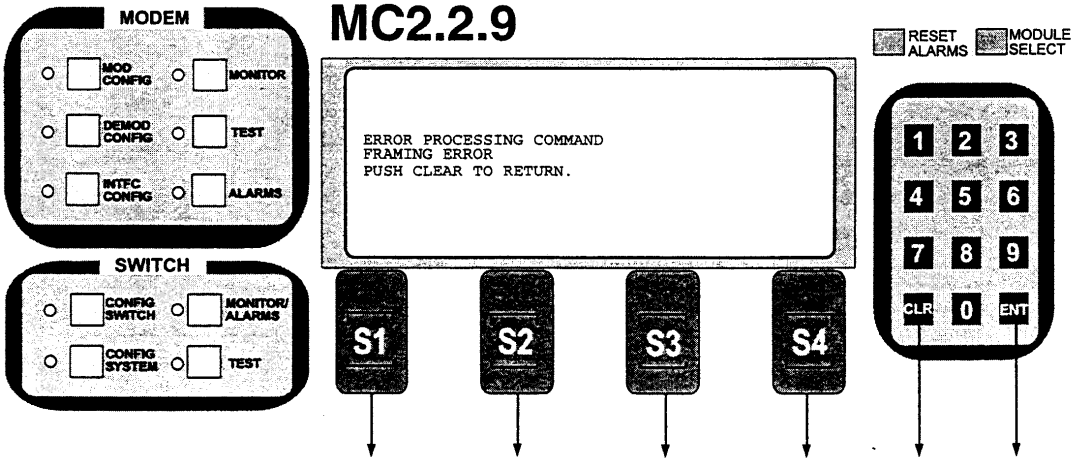
NOTE: Inner FEC -- Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, NONE

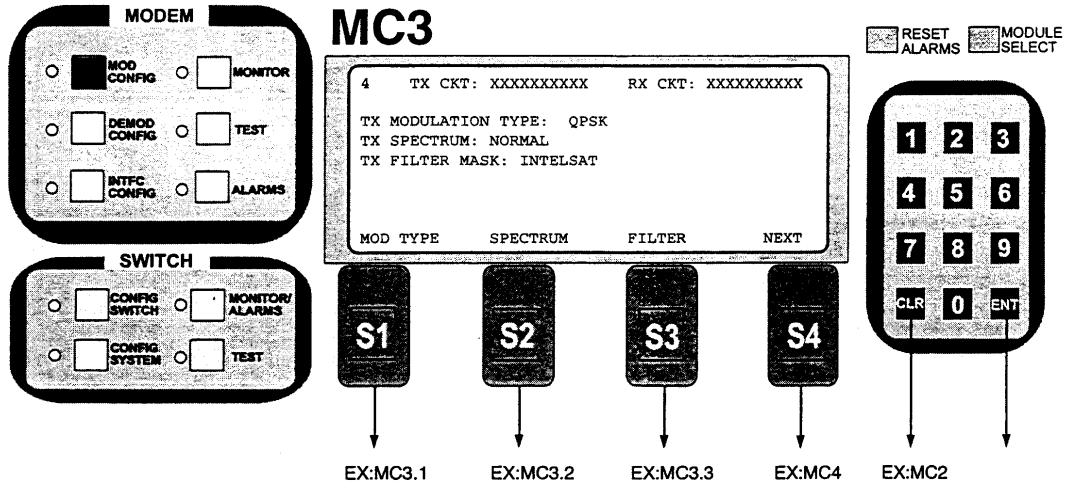


NOTE: Inner FEC -- Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE.
CSC 3/4 = ComStream 3/4 Rate Sequential Compatible.

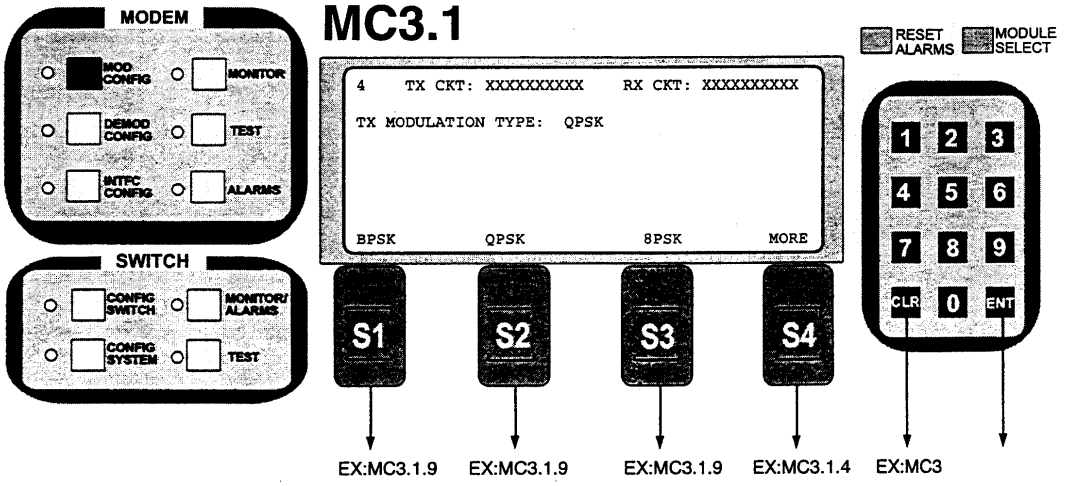



MC2.2
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
TX FRAMING TYPE: 96 KBPS
16/15 96 KBS NONE RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:MC2.2.9
EX:MC2.2.9
EX:MC2.2.9
EX:2.1

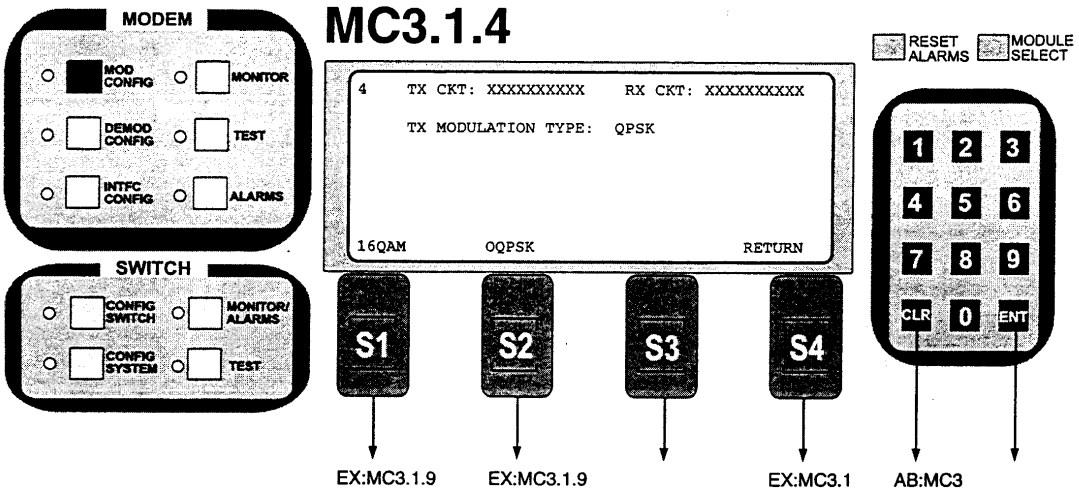

MC2.2.9
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
ERROR PROCESSING COMMAND
FRAMING ERROR
PUSH CLEAR TO RETURN.
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT



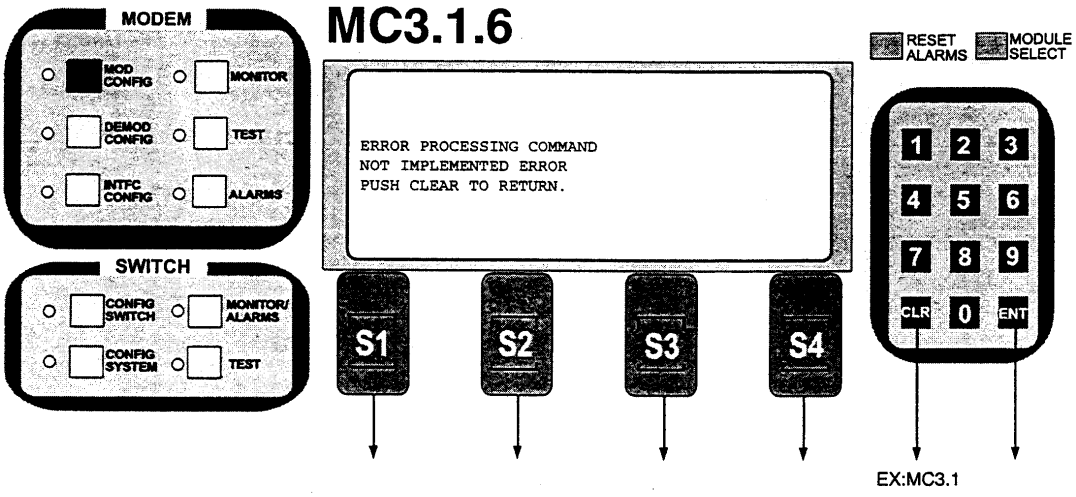
Note: Select Modulation, Spectrum or Spectral Mask as shown in the following screens.

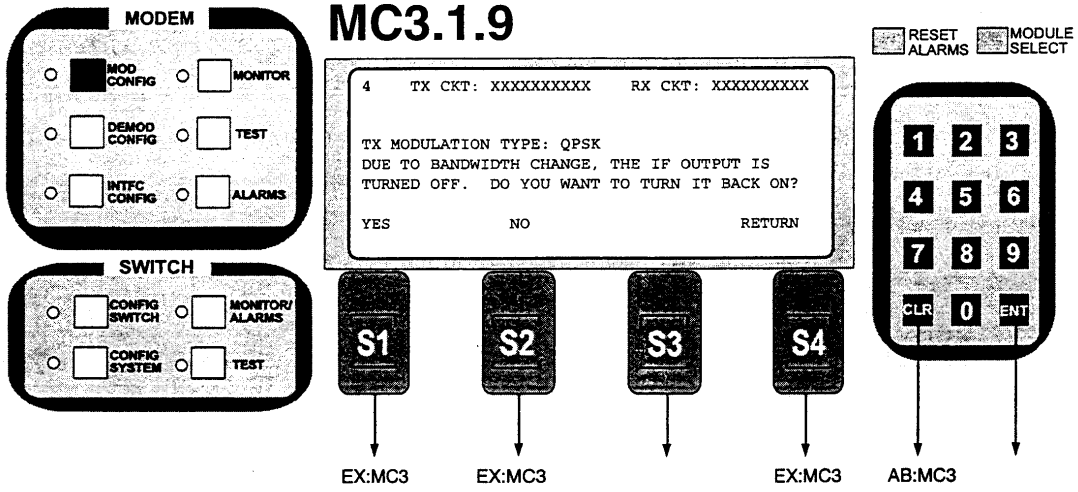


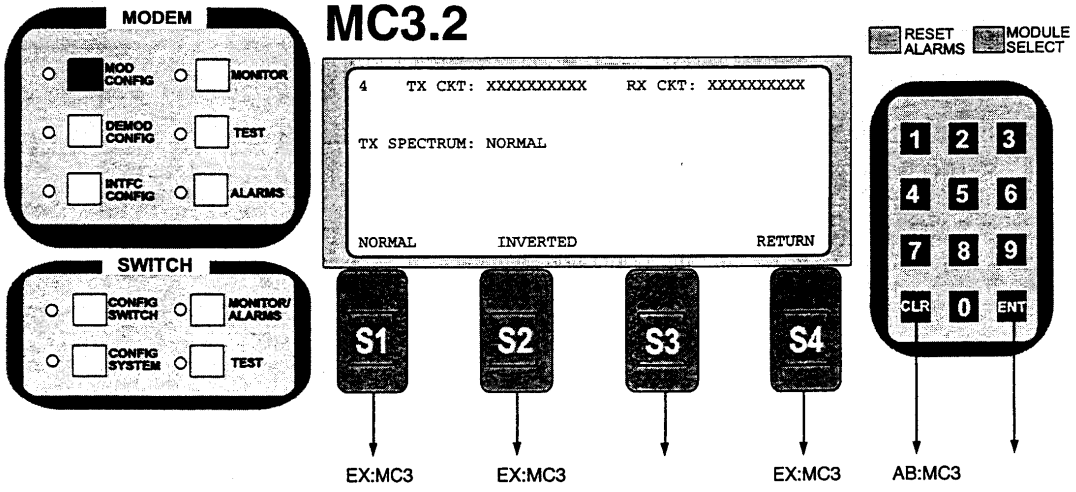
Note: Modulation Type: Select BPSK, QPSK, 8PSK or MORE for additional selections.



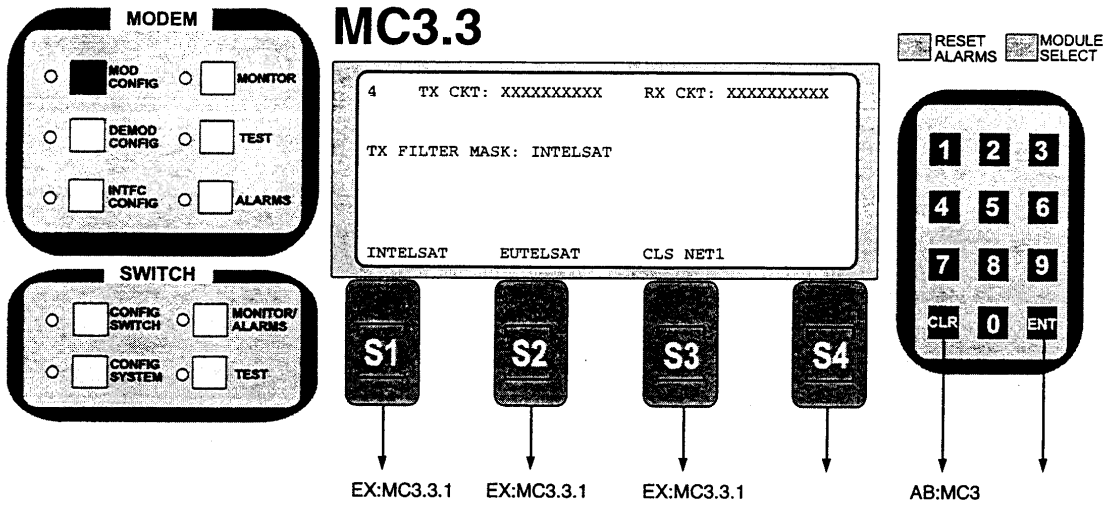
Note: Tx Modulation Type: Select 16QAM or OQPSK or Return to Screen 3.1. If the Modulation type is not implemented, the screen below will appear.



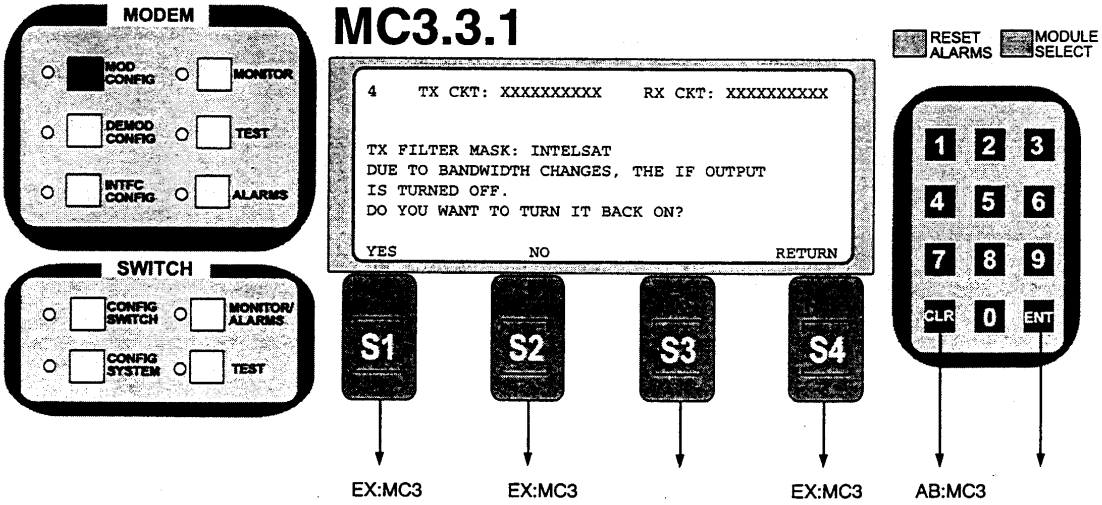


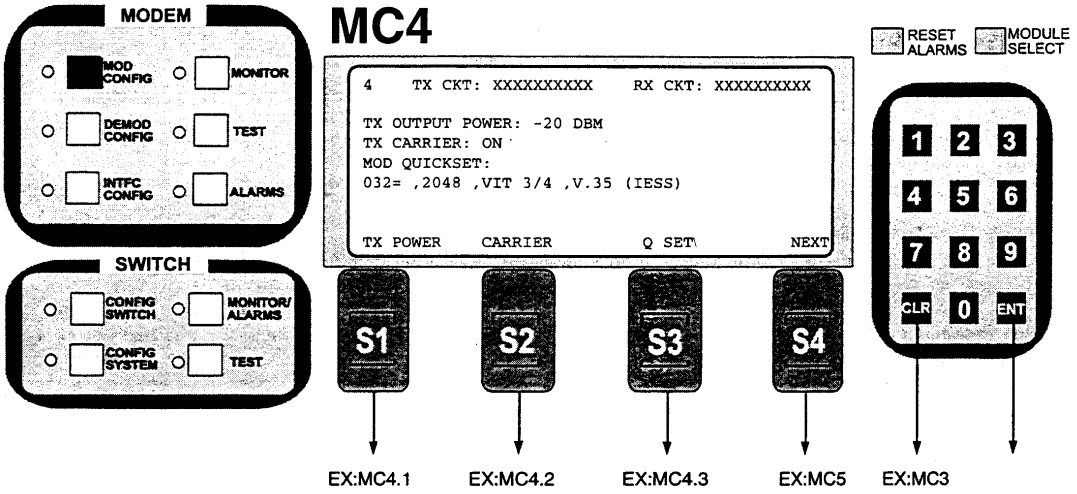


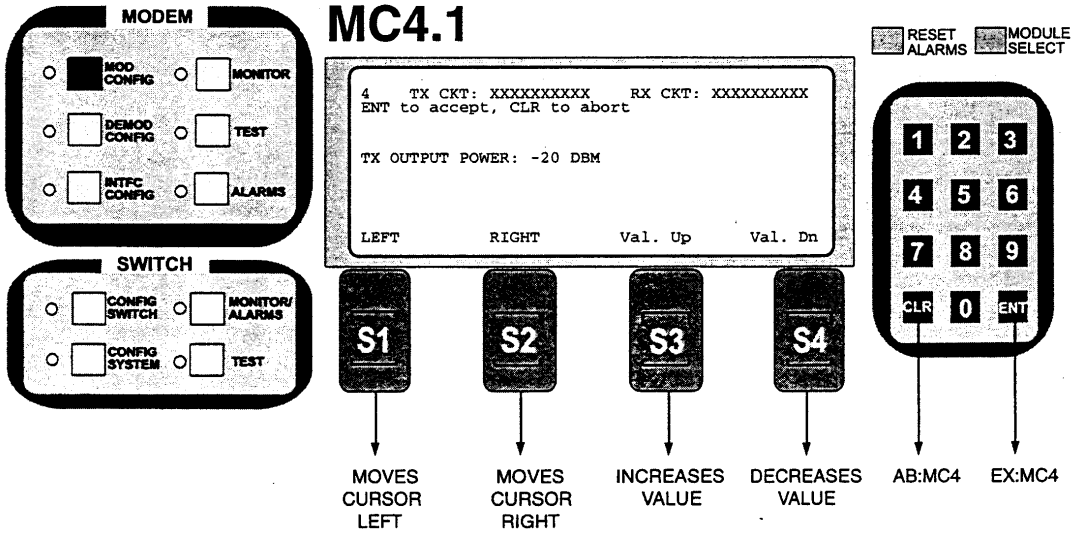
Note: Select Normal or Inverted Tx Spectrum.



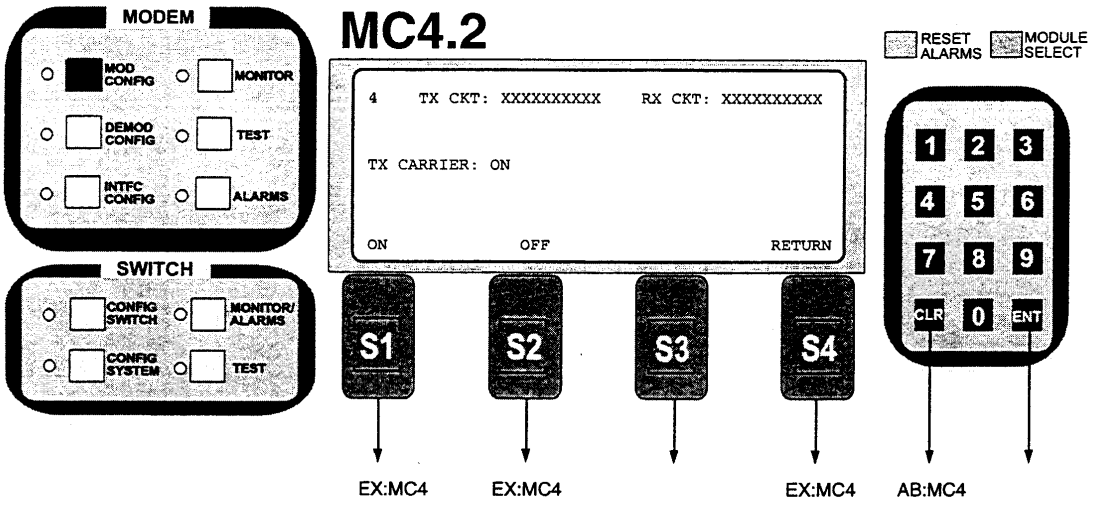
Note: Filter Mask sets shape of the TX data filter. Select INTELSAT, EUTELSAT, CLS NET



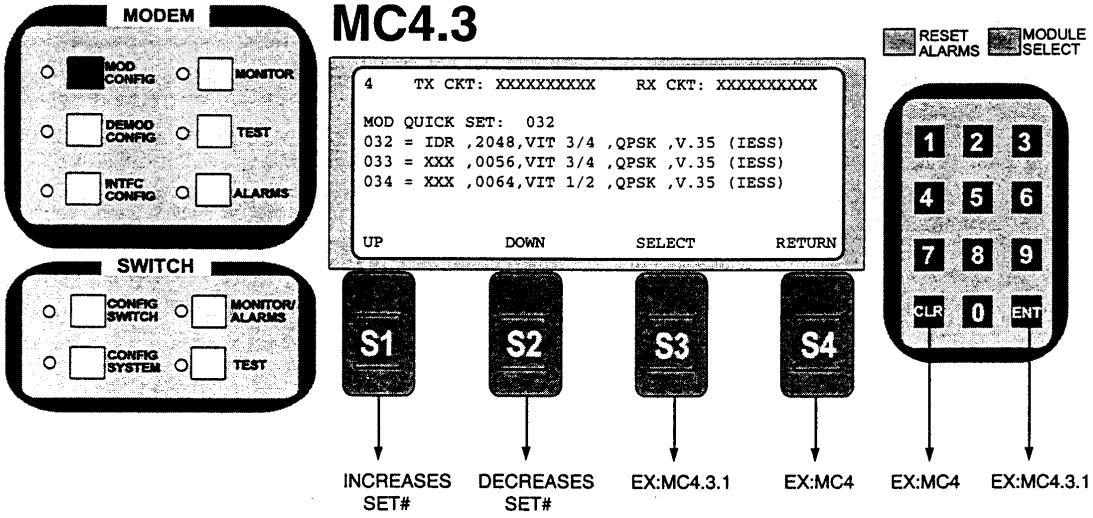




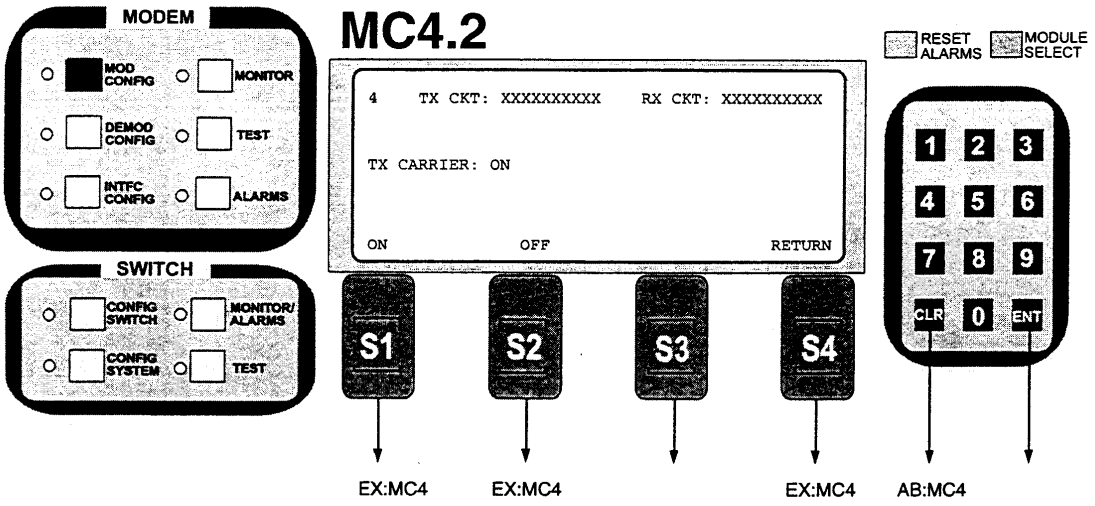
Note: TX Output Power: Level is entered in dBm from +5 to -20 dBm



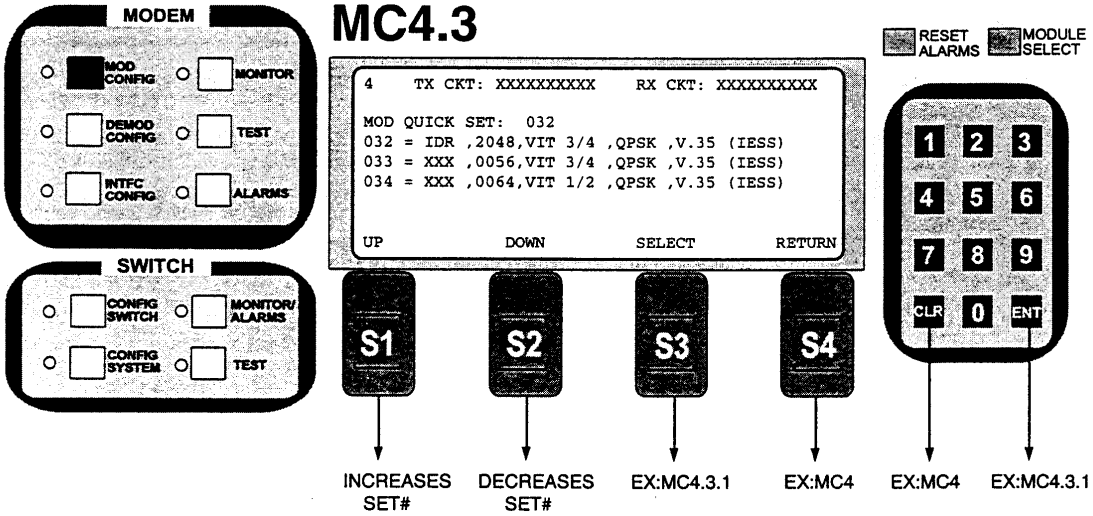
Note: TX Carrier: Turns carrier ON or OFF.



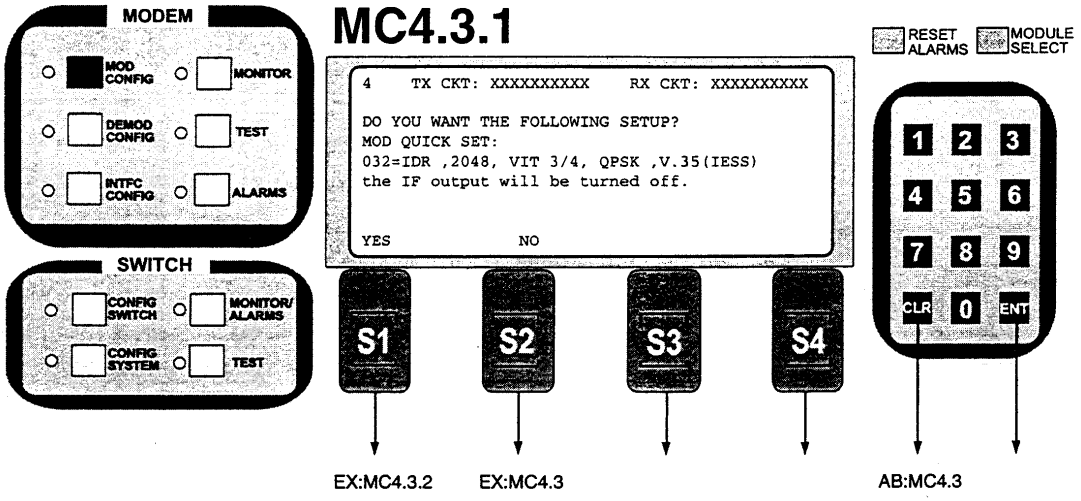
Note: MOD Quick Set. A preassigned number that sets many modem parameters such as Data Rate, Code Rate, Mode, Framing Type, Scrambler Type and Spectral Mask. Referring to Table 3-2, "RCS10 Strap Codes," if you know the strap code, enter it using the keypad and enter. Also, if you enter the new strap code and depress S3 - Select, the existing strap code will be selected, not the new entry.

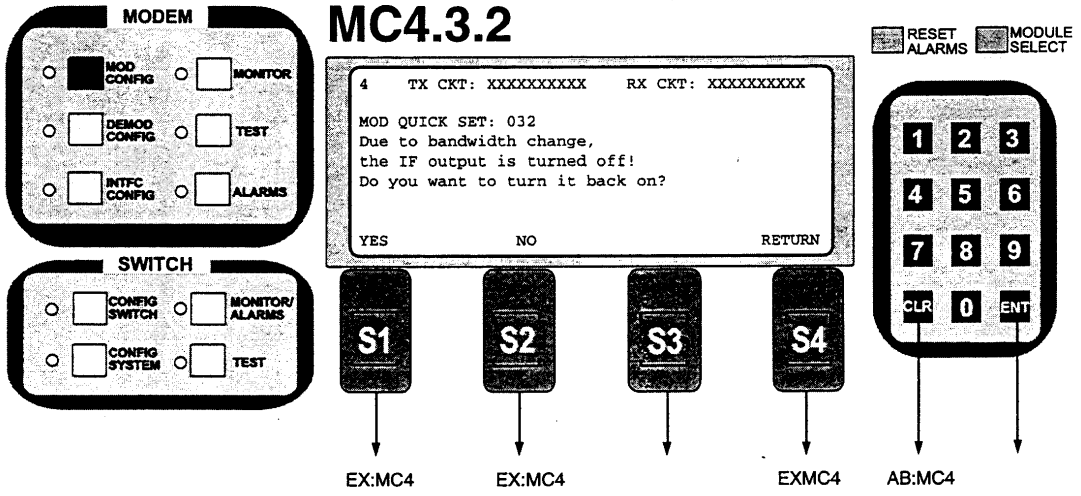


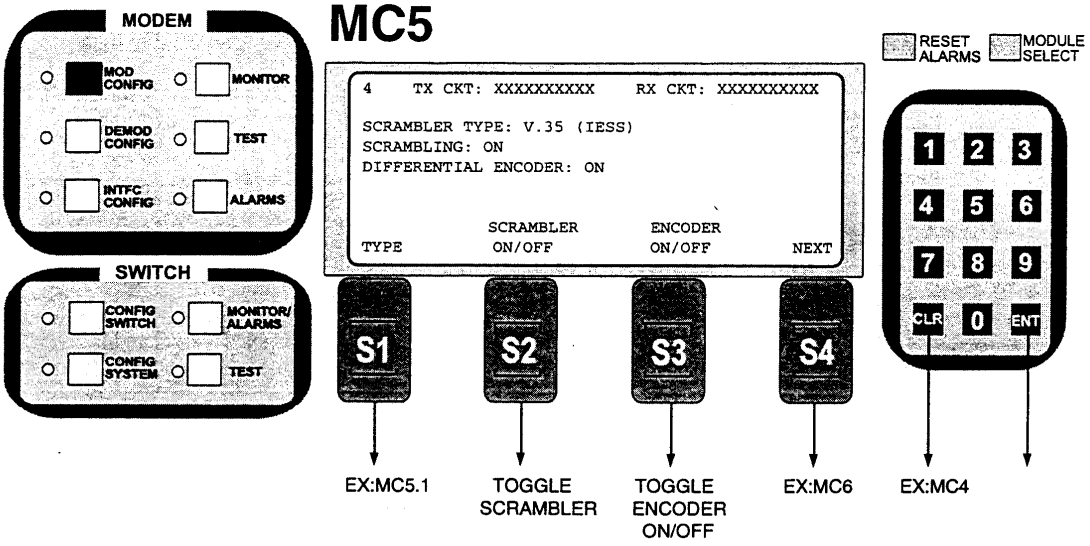
Note: TX Carrier: Turns carrier ON or OFF.



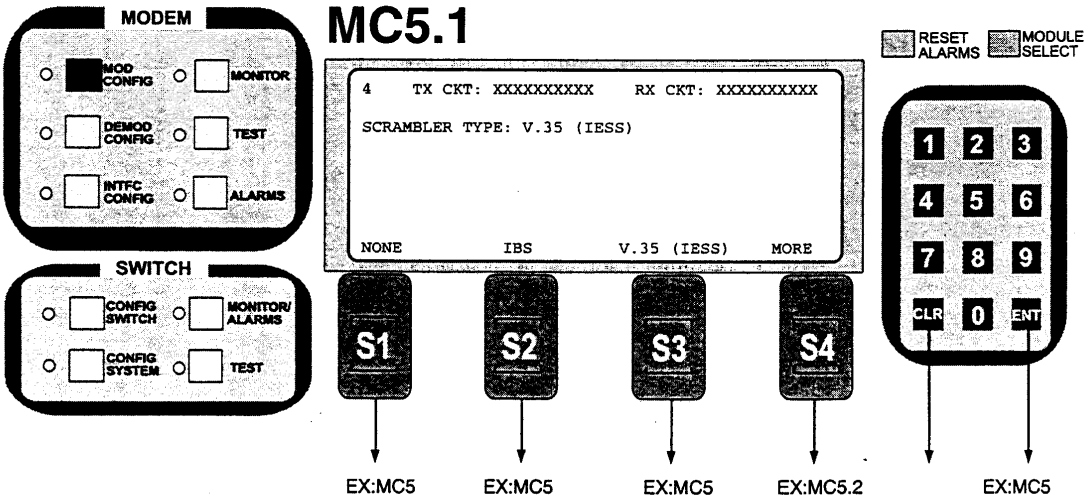
Note: MOD Quick Set. A preassigned number that sets many modem parameters such as Data Rate, Code Rate, Mode, Framing Type, Scrambler Type and Spectral Mask. Referring to Table 3-2, "RCS10 Strap Codes," if you know the strap code, enter it using the keypad and enter. Also, if you enter the new strap code and depress S3 - Select, the existing strap code will be selected, not the new entry.


MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
MC4.3.1
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
DO YOU WANT THE FOLLOWING SETUP?
MOD QUICK SET:
032=IDR ,2048, VIT 3/4, QPSK ,V.35(IESS)
the IF output will be turned off.
YES NO
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:MC4.3.2
EX:MC4.3
AB:MC4.3

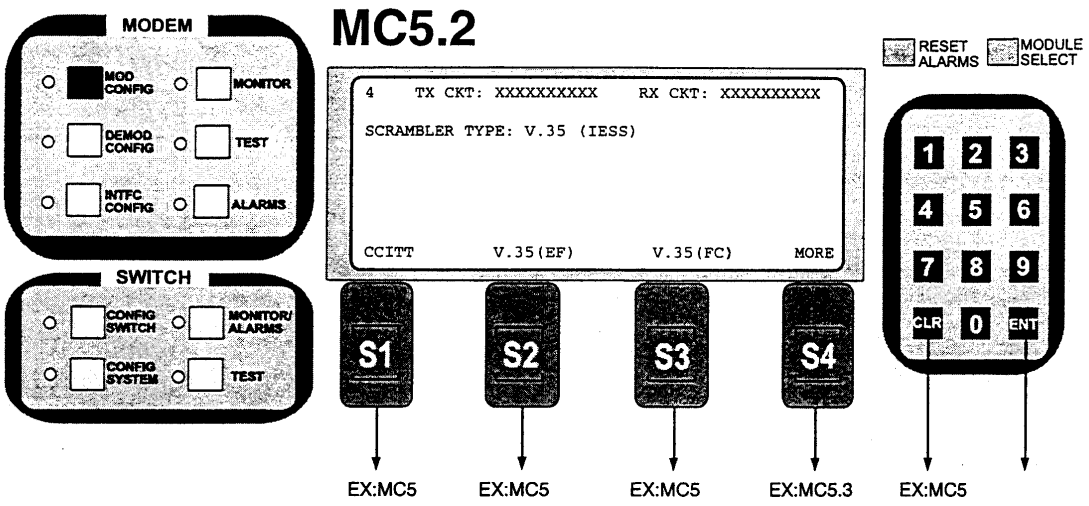

MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
MC4.3.2
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
MOD QUICK SET: 032
Due to bandwidth change,
the IF output is turned off!
Do you want to turn it back on?
YES NO RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:MC4
EX:MC4
EXMC4
AB:MC4



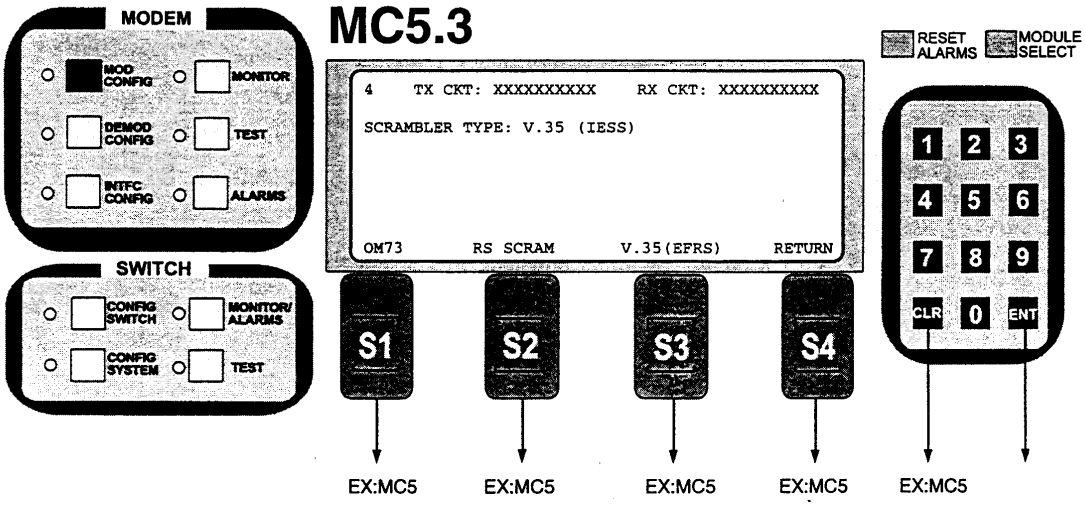
Note: Scrambler On/Off: Turns Scrambler On or OFF.
Encoder On/Off: Enables or Disables Differential Encoder



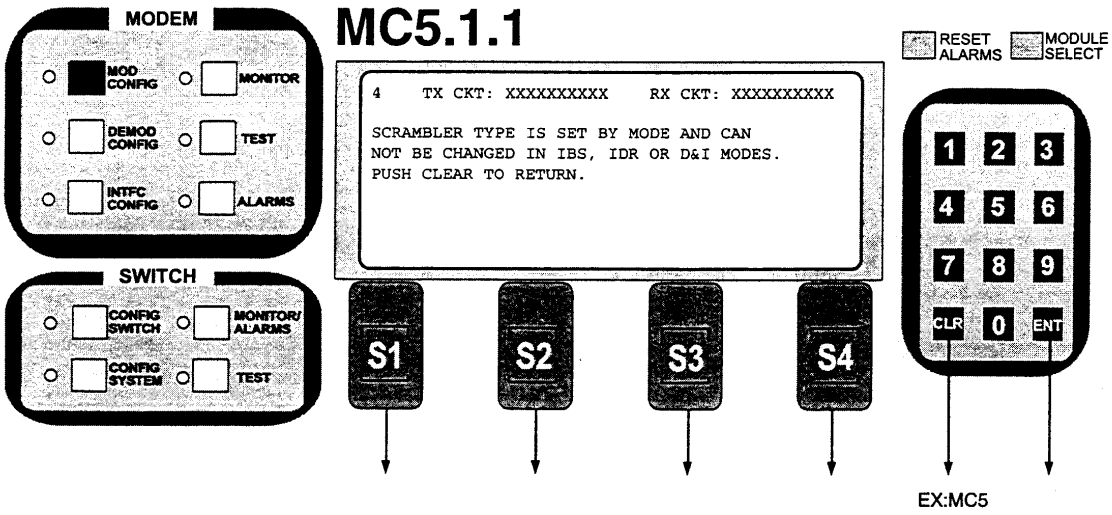
Note: Scrambler Type: Select None, IBS or V.35 (IESS).

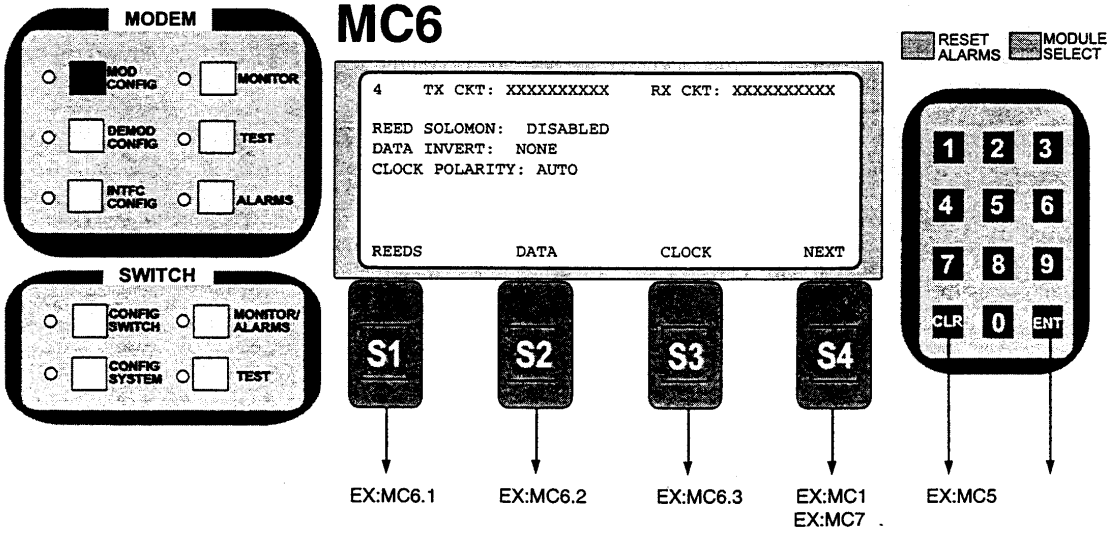


Note: Scrambler Type: Select CCITT, V.35 (EF), V.35 (FC).

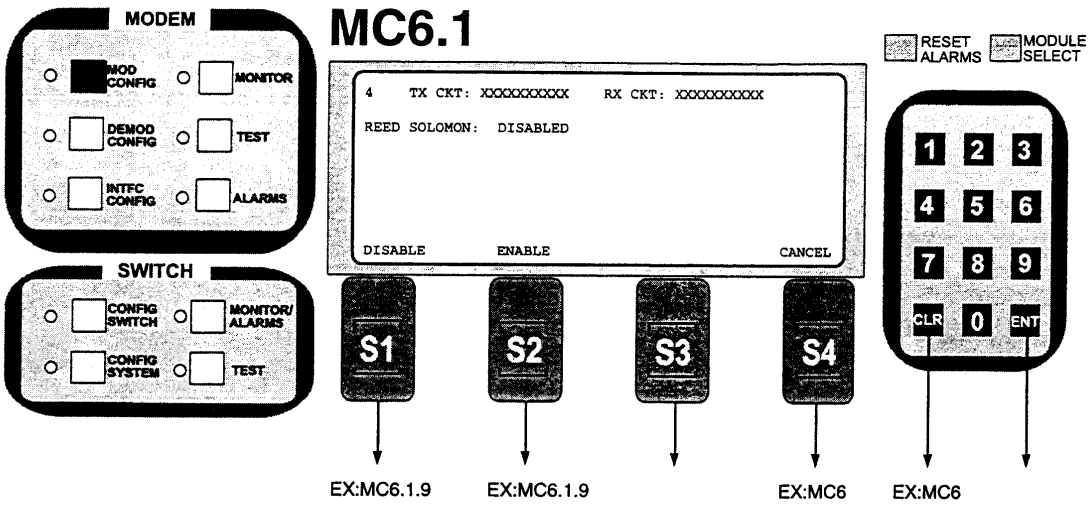


Note: Scrambler Type: Select OM73, RS SCRAM or V.35 (EFRS).

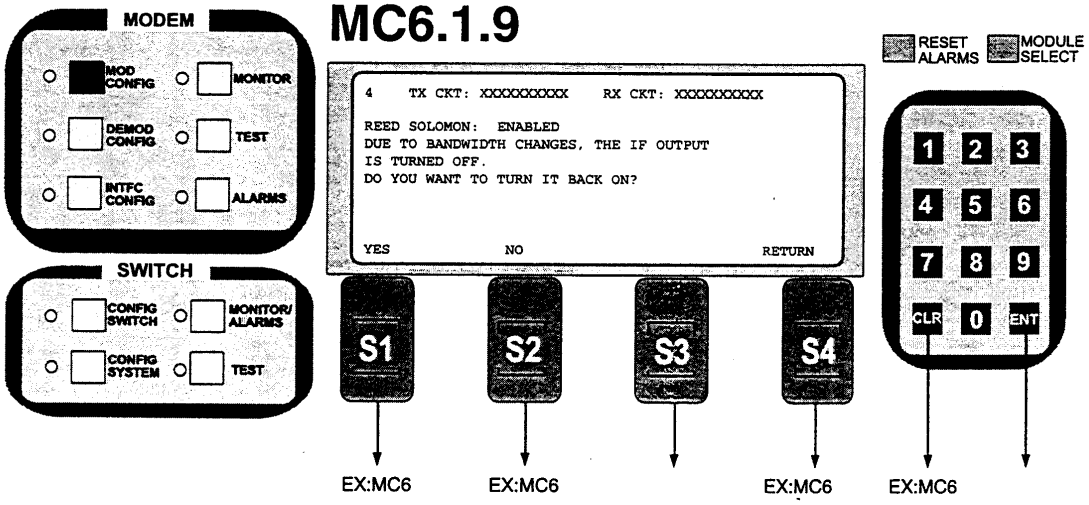


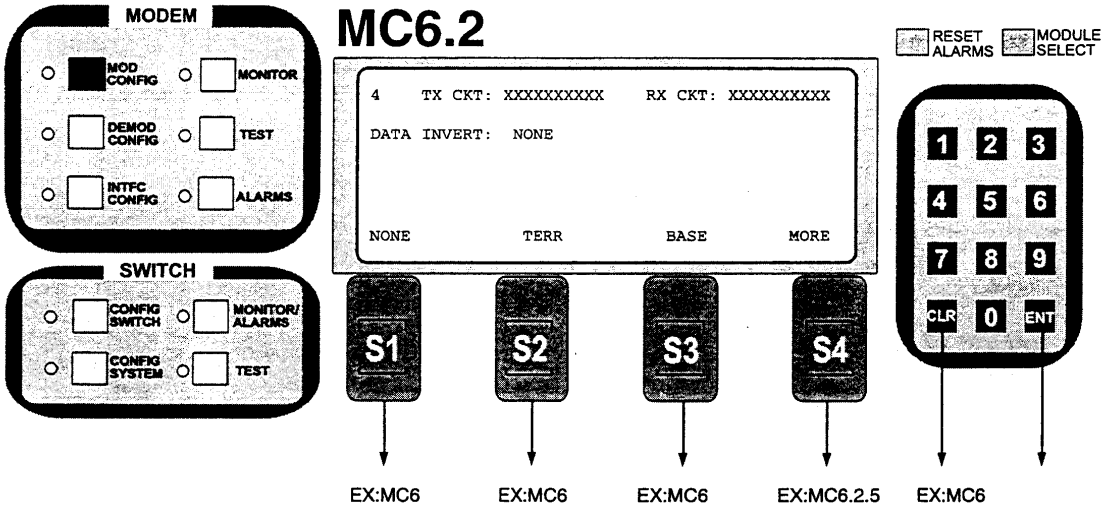


Note: If Reed-Slomon is Enabled, S4 will move you to MC7

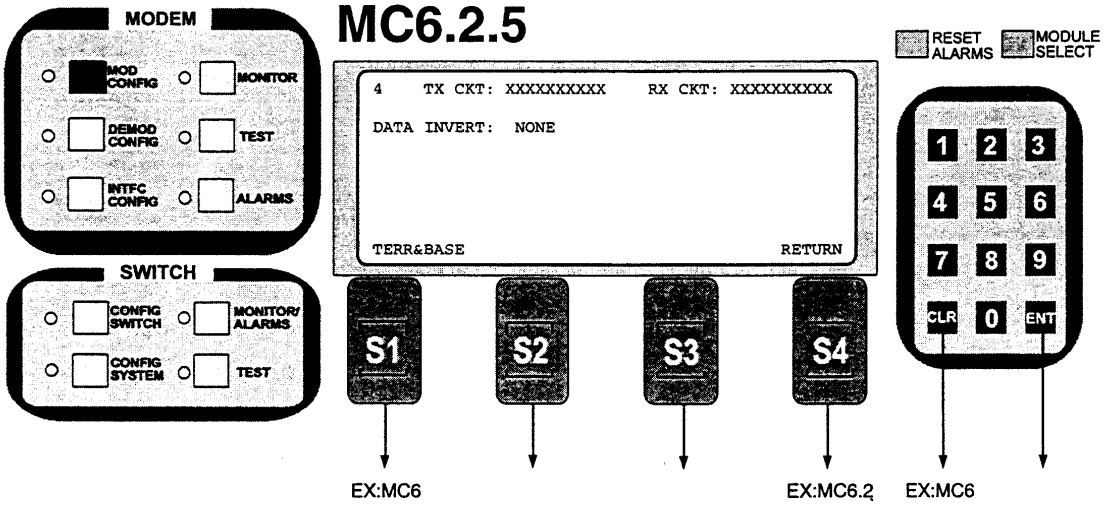


Note: Reed Solomon: Enable or Disable Reed Solomon Encoder

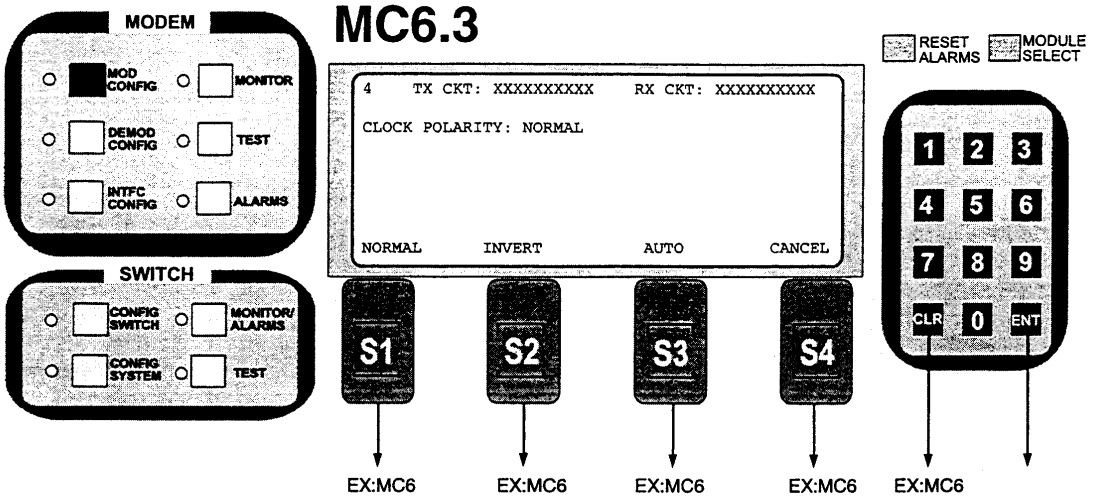


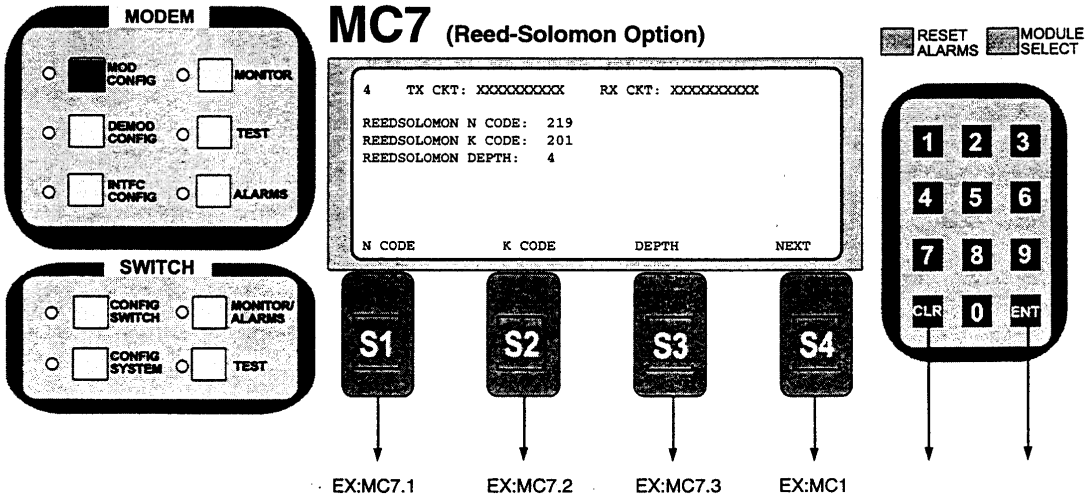


Note: Data Invert inverts the direction of rotation for PSK Modulation. Select None, Terrestrial, Baseband or Terrestrial and Baseband. None meets the IESS specification.

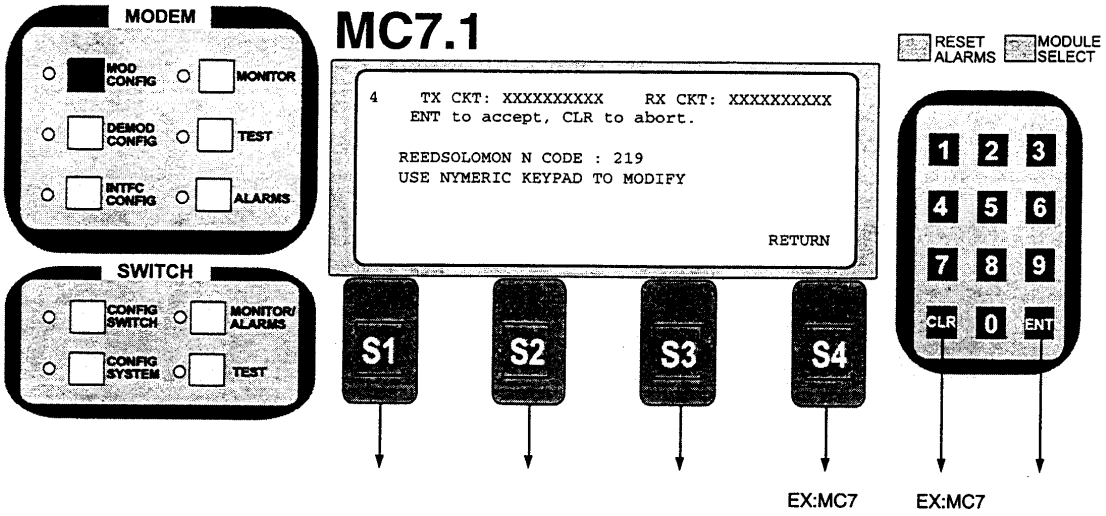


Note: Data Invert inverts the direction of rotation for PSK Modulation. Select None, Terrestrial, Baseband or Terrestrial and Baseband. None meets the IESS specification.

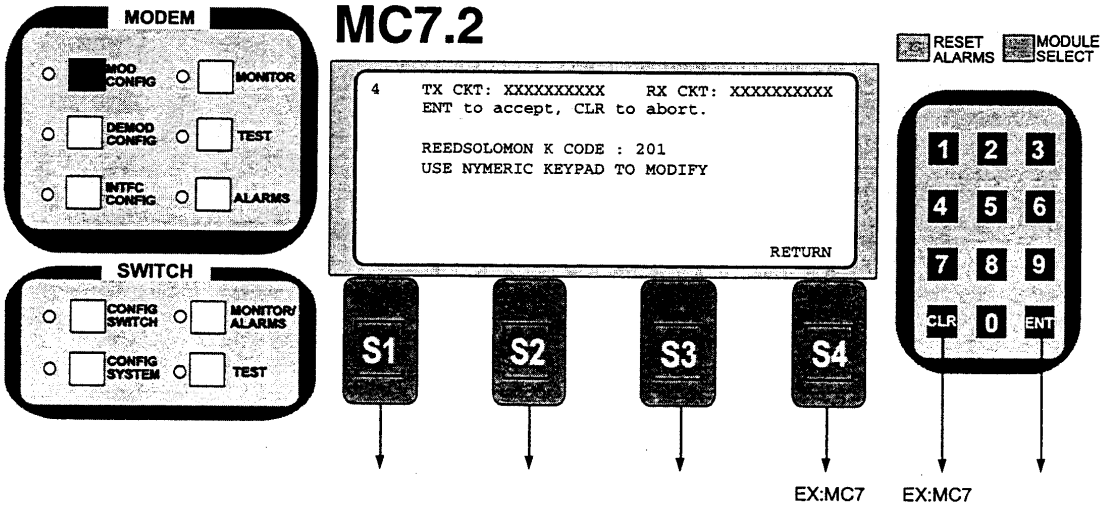

MC6.3
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
CLOCK POLARITY: NORMAL
NORMAL
INVERT
AUTO
CANCEL
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:MC6
EX:MC6
EX:MC6
EX:MC6
EX:MC6


MC7 (Reed-Solomon Option)
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
REEDSOLOMON N CODE: 219
REEDSOLOMON K CODE: 201
REEDSOLOMON DEPTH: 4
N CODE
K CODE
DEPTH
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:MC7.1
EX:MC7.2
EX:MC7.3
EX:MC1

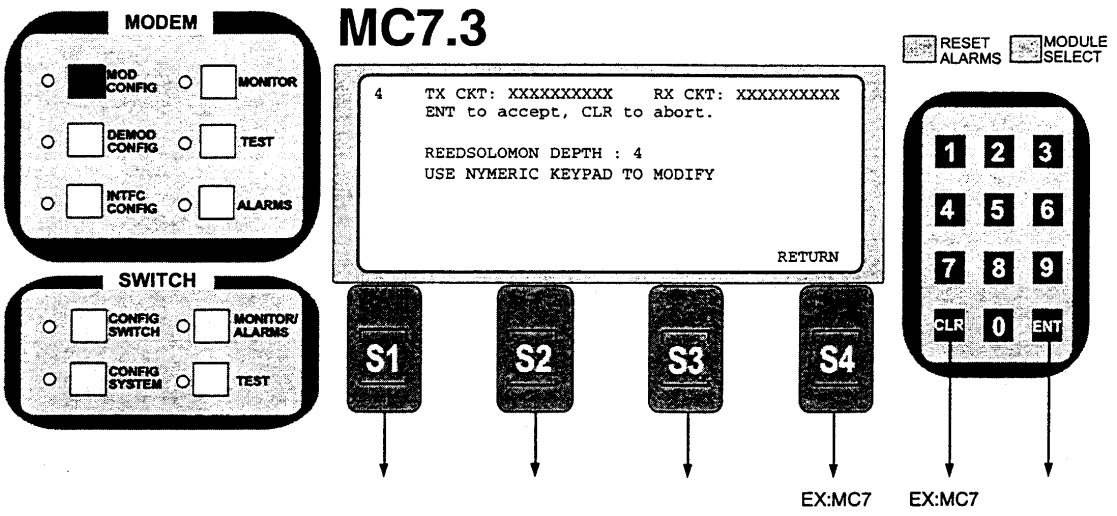
Note:



Note: Reed-Solomon Codes: Displays the currently used n and k Reed-Solomon codes. In closed net mode, custom RS codes may be selected.



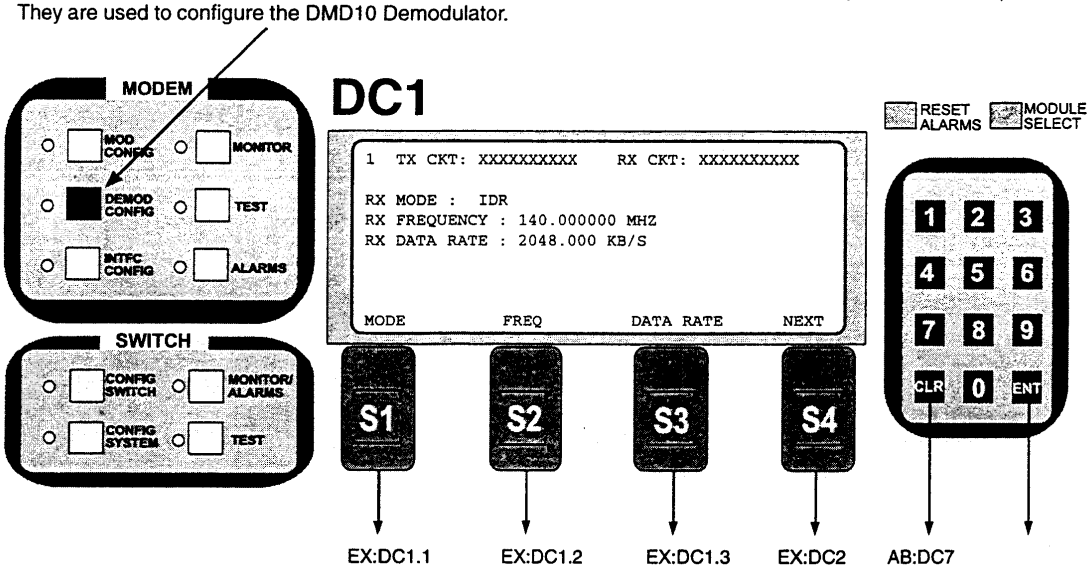
Note: Reed-Solomon Codes: Displays the currently used n and k Reed-Solomon codes. In closed net mode, custom RS codes may be selected.



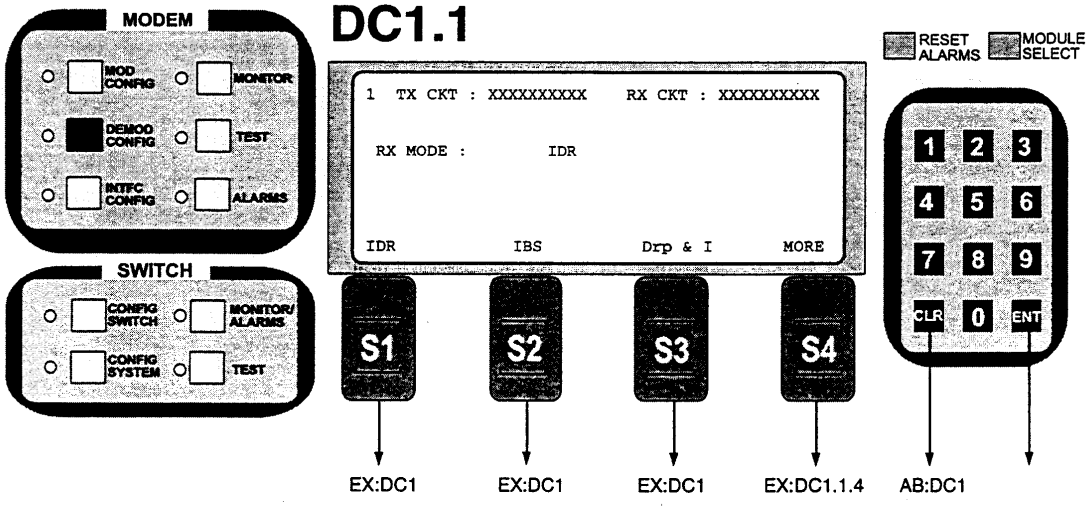
Note: Reed-Solomon Depth: Displays the currently used Reed-Solomon interleaver depth. In Closed Net Mode, Depth = 8 or 4 may be selected.

3.10 Demodulator Configuration

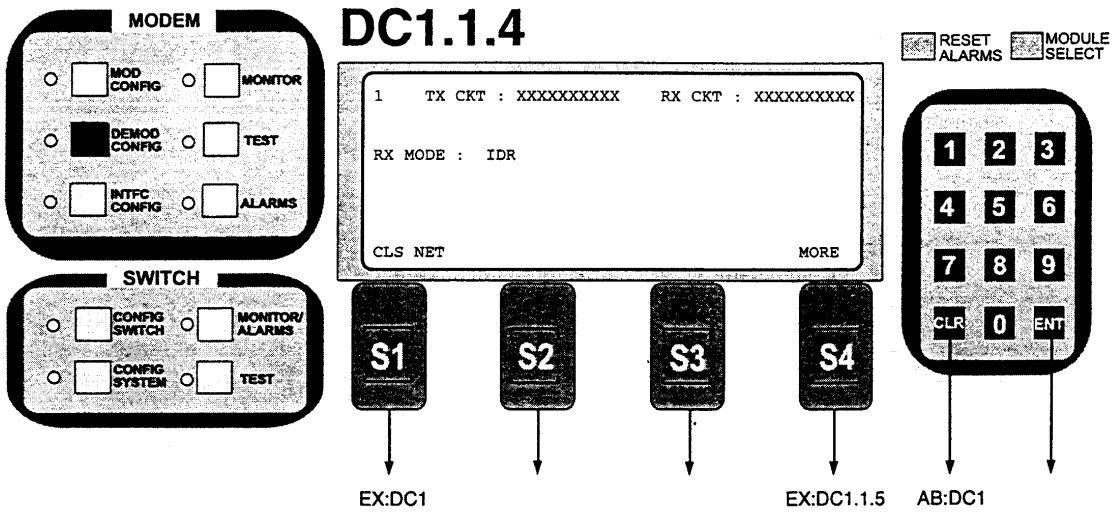
The following screens are accessible by depressing the DEMOD CONFIG button at the top left of the front panel. They are used to configure the DMD10 Demodulator.



Note: Top level screen for navigating through the RCS10 Rx Modes, Frequencies and Data Rates



Note: Select IDR, IBS, Drop and Insert or More Modes of Operation.



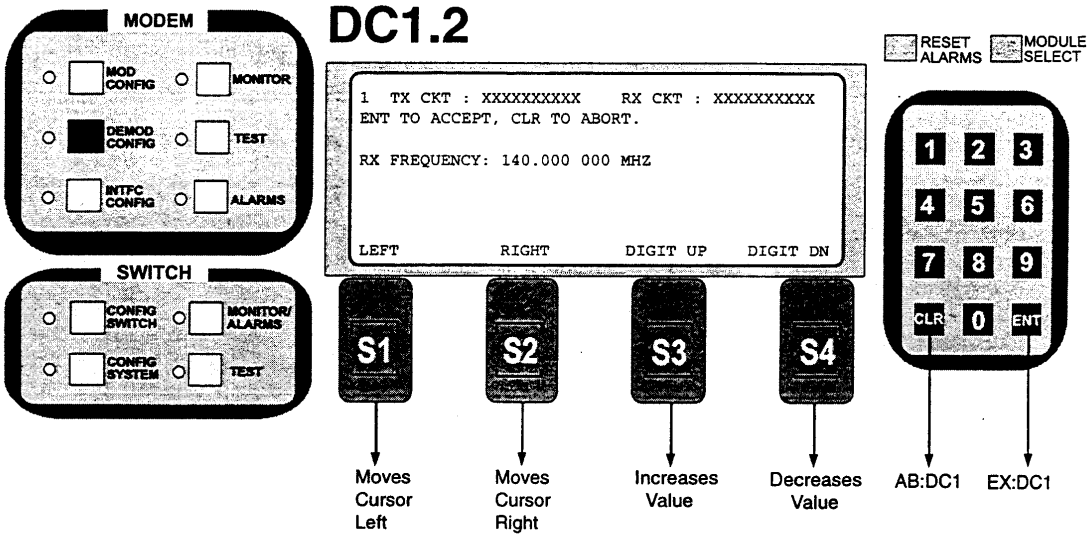
RX Mode – The mode command sets a number of parameters within the modem to meet a set specification. The purpose is to eliminate keystrokes and potential compatibility problems. Additionally, data rates not covered by the given mode of operation will not be allowed. If the mode of operation is selected after the data rate has been entered, then the data rate must be compatible with the desired mode of operation or the mode will not be allowed. The following parameters are set for the given mode of operation and cannot be changed while the unit is in the given mode of operation:

IDR Mode: (IESS-308)
Data rates: 1.544, 2.048, 6.312, 8.448 Mbps
Framing Type: 96 KB/S (IDR)
Descrambler Type: V.35
Spectrum Mask: Intelsat
Data Rates: Below 1.544
Framing Type: 16/15 (IBS)
Descrambler Type: IESS-309
Spectrum Mask: Intelsat

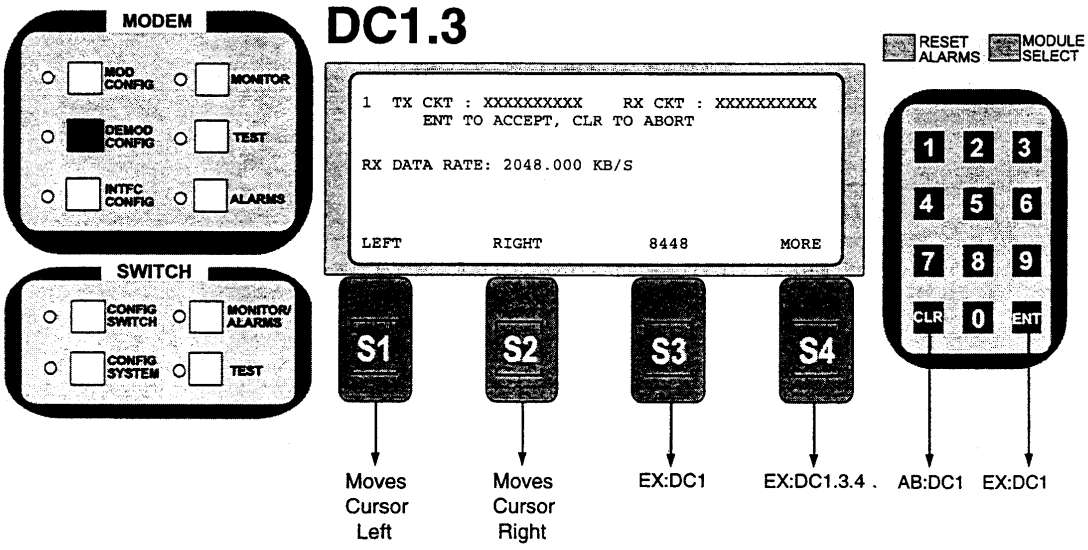
IBS Mode: (IESS-309)
Data Rates: 2.048 Mbps and below
Framing Type: 16/15 (IBS)
Descrambler Type: IESS-309
Spectrum Mask: Intelsat

Drop & Insert:
Data Rates: n x 64 n =1, 2, 3, 4, 5, 6, 8, 10,12, 15, 16, 20, 24, 30
Framing Type: 16/15 (IBS)
Descrambler Type: IESS-309
Spectrum Mask: Intelsat

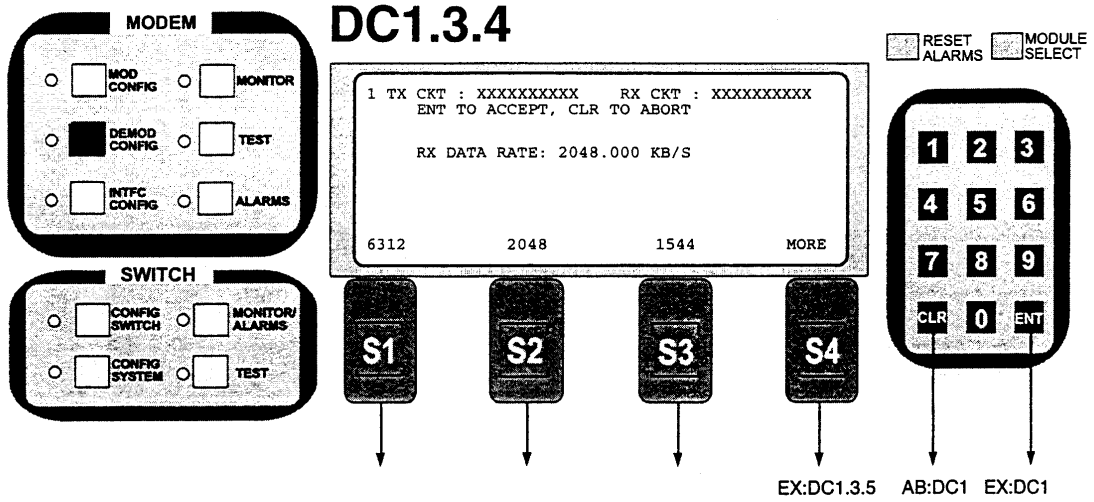
Closed Net: All possible combinations allowed



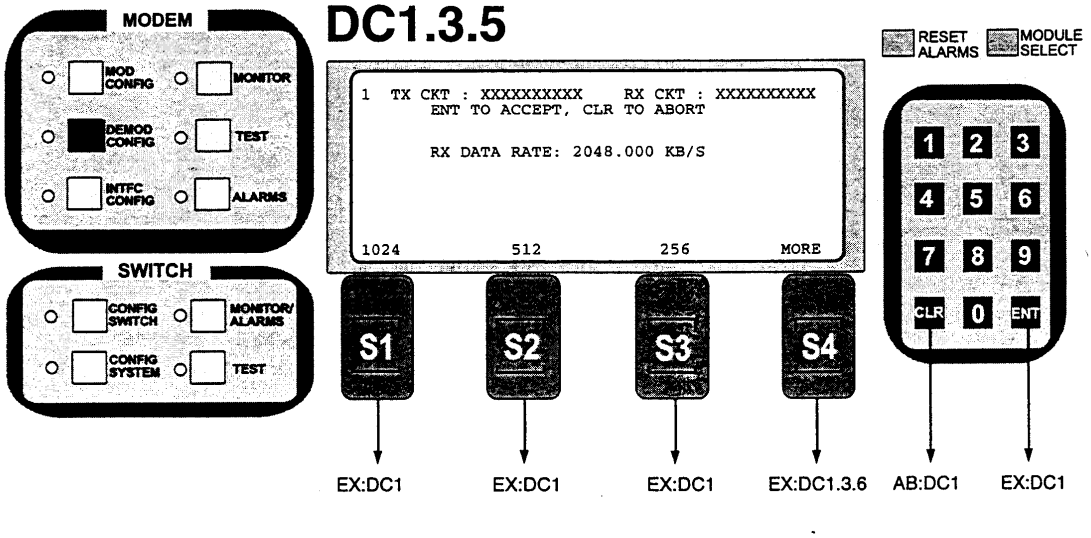
Note: Valid frequency range is 50-90 MHz and 100-180 MHz in 1 Hz increments. Value may be entered using keypad digits. Hit ENT any time -- value displayed will be programmed.



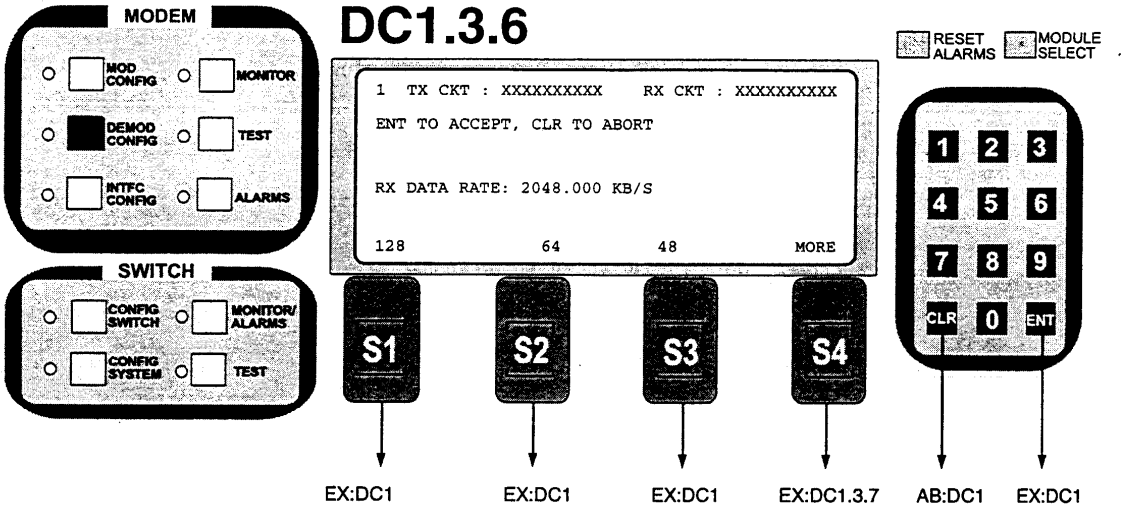
Note: Data rate in bit-per-second steps. Value may be entered using keypad digits.
Hit ENT at any time -- value displayed will be programmed.



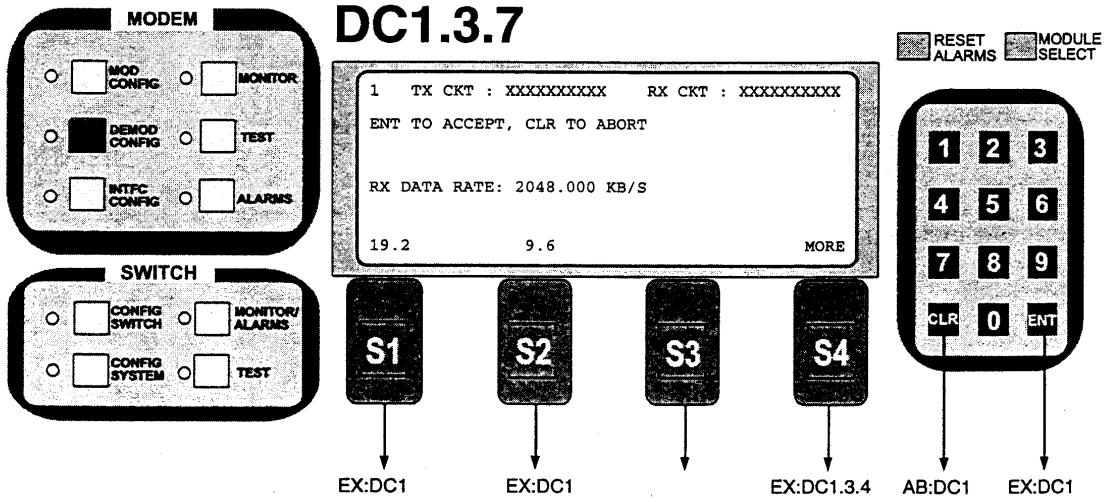
Note: Data rate in bit-per-second steps. Value may be entered using keypad digits.
Hit ENT at any time -- value displayed will be programmed.



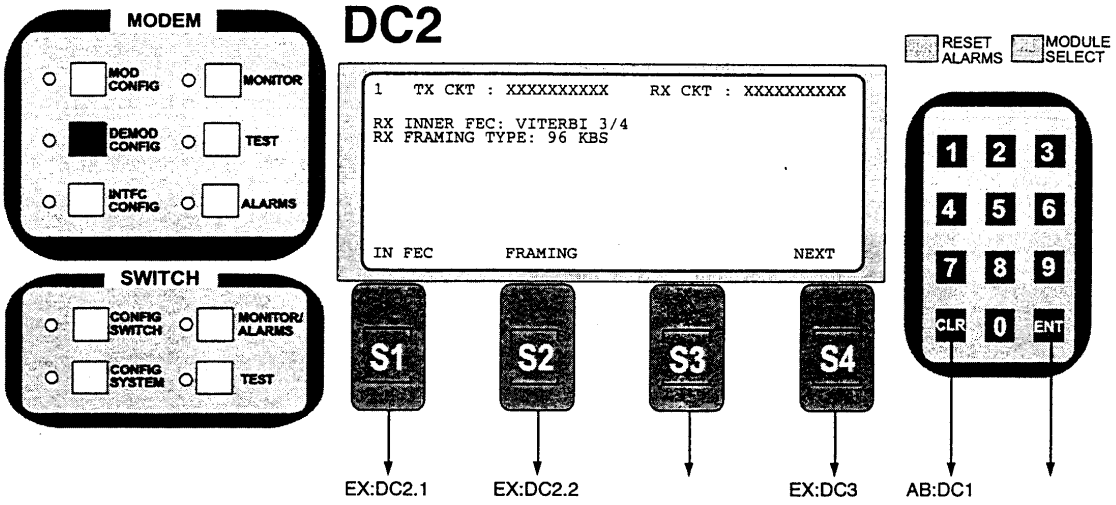
Note: Data rate in bit-per-second steps. Value may be entered using keypad digits.
Hit ENT at any time -- value displayed will be programmed.



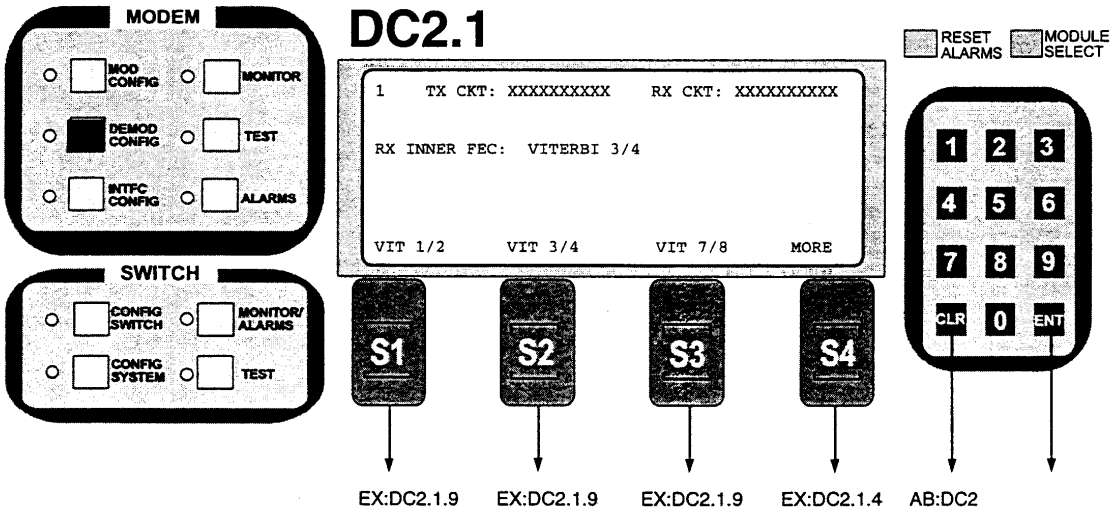
NOTE: Data rate in bit-per-second steps. Value may be entered using keypad digits. Hit ENT at any time -- value displayed will be programmed.



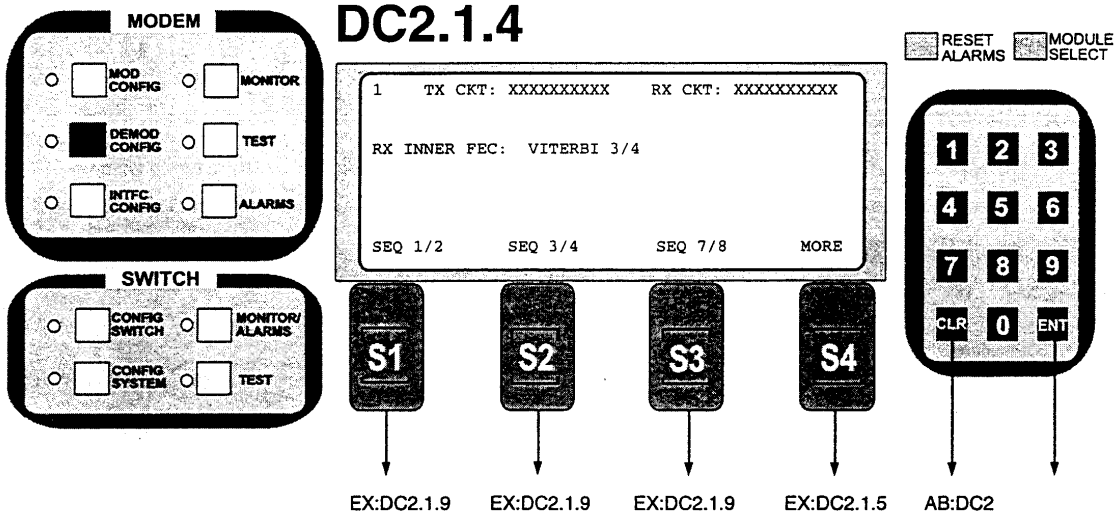
NOTE: Data rate in bit-per-second steps. Value may be entered using keypad digits. Hit ENT at any time -- value displayed will be programmed.



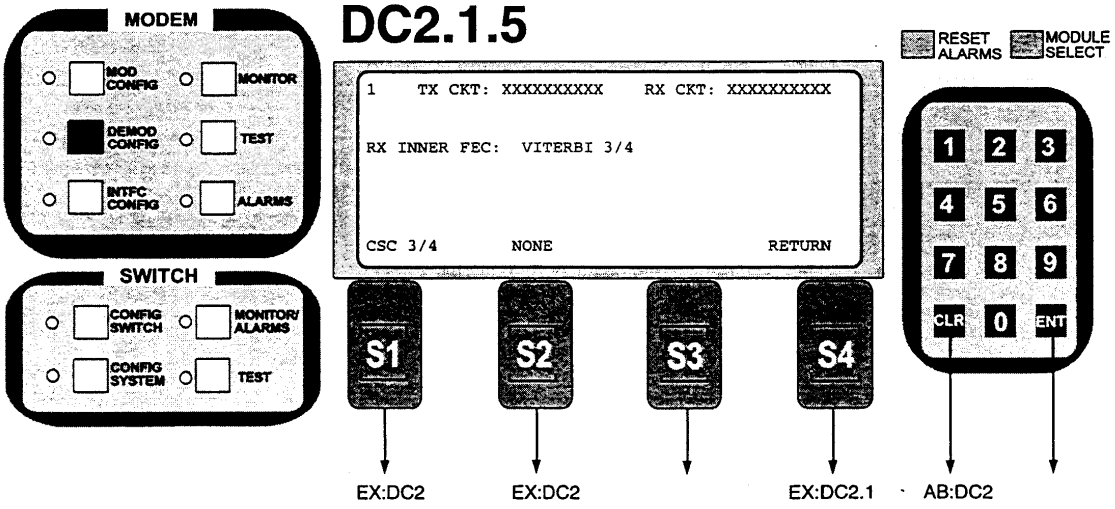
NOTE: Select RX Inner FEC and Framing types.



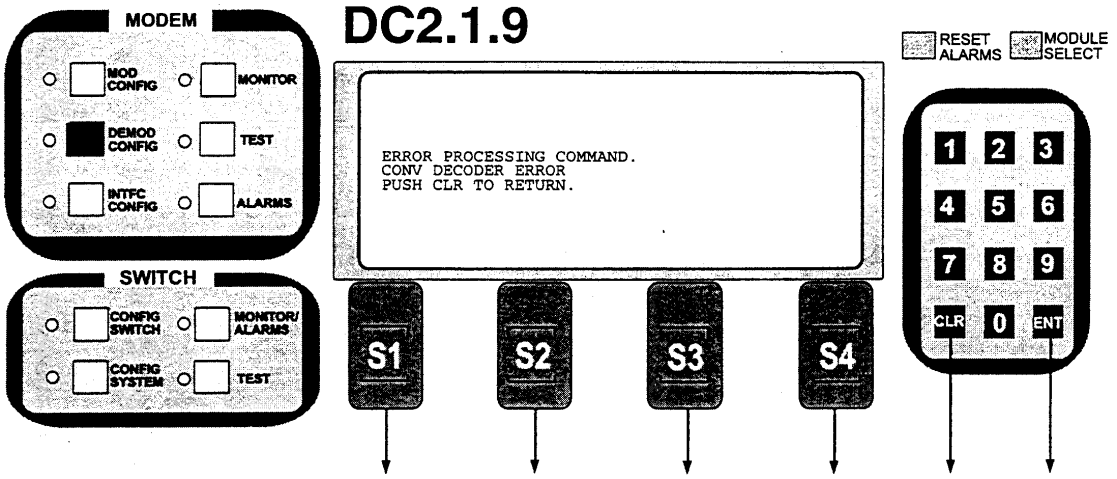
NOTE: Inner FEC -- Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE. If a selection is made that is not allowed with the current configuration "Error Processing Command" screen DC2.1.9 will appear. Depress Clear to return.



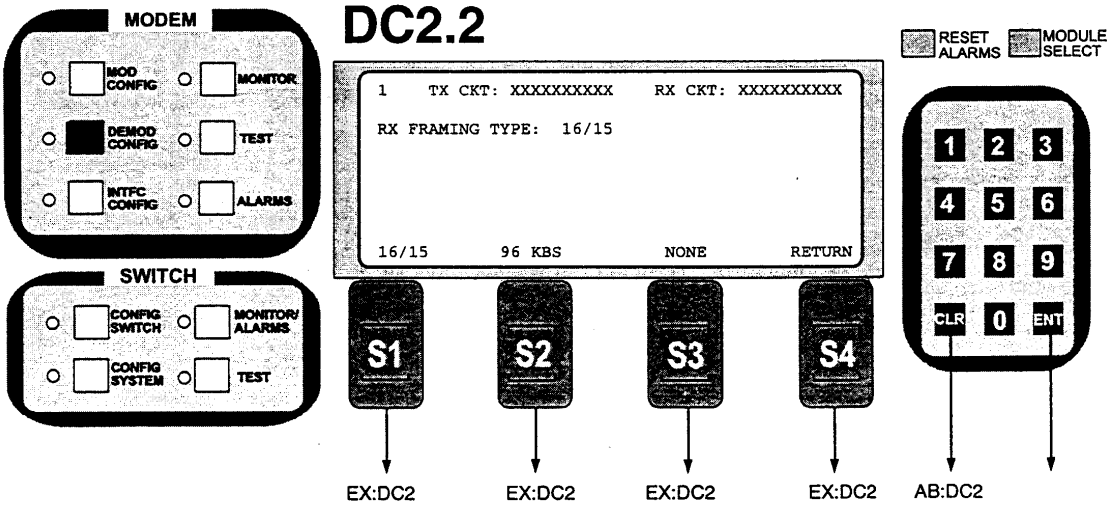
NOTE: Inner FEC -- Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, NONE.



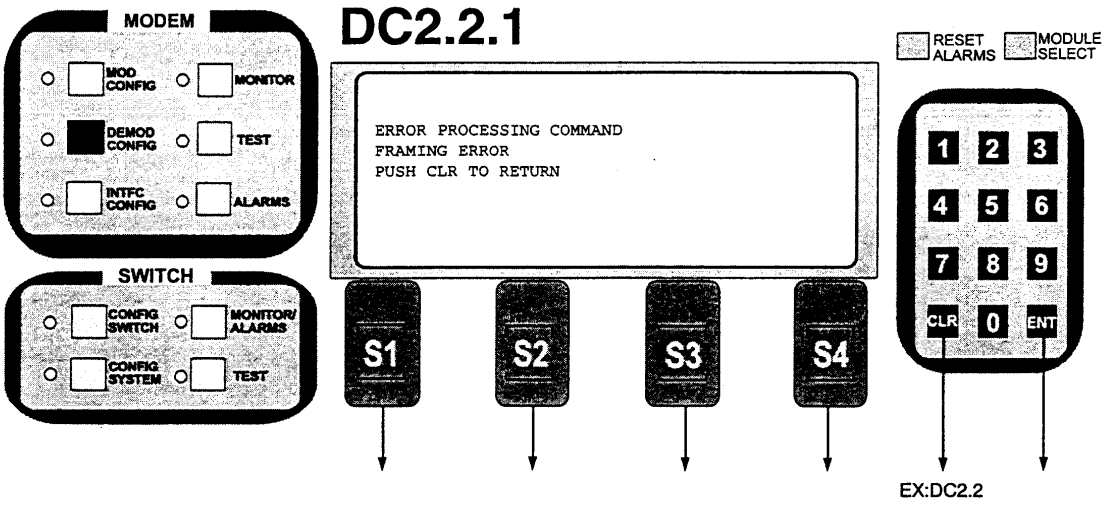
NOTE: Inner FEC -- Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE.
CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode



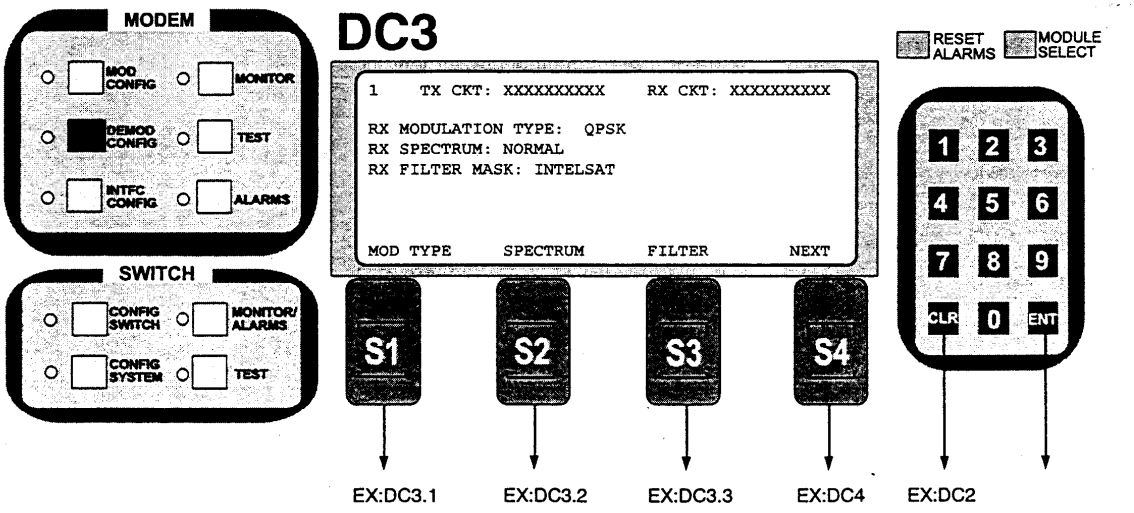
Note: This screen will appear if the Demodulation type is not installed or supported.

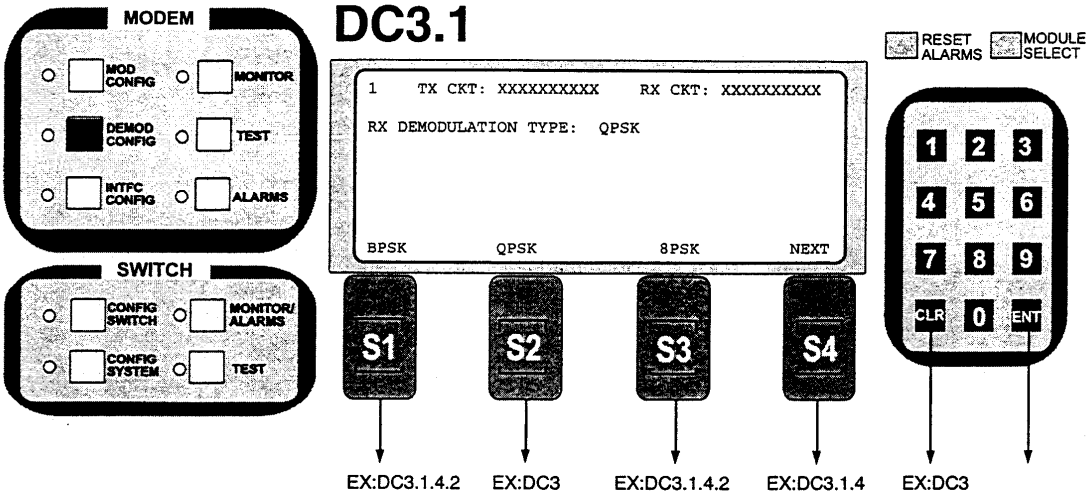


NOTE:Framing Type: Select 16/15 (IBS), 96 Kbps (IDR) or NONE.

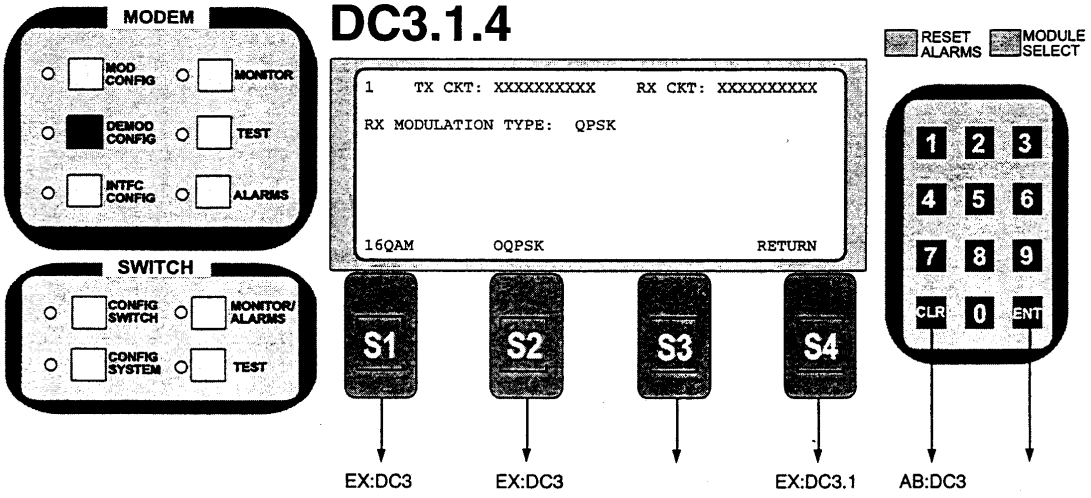


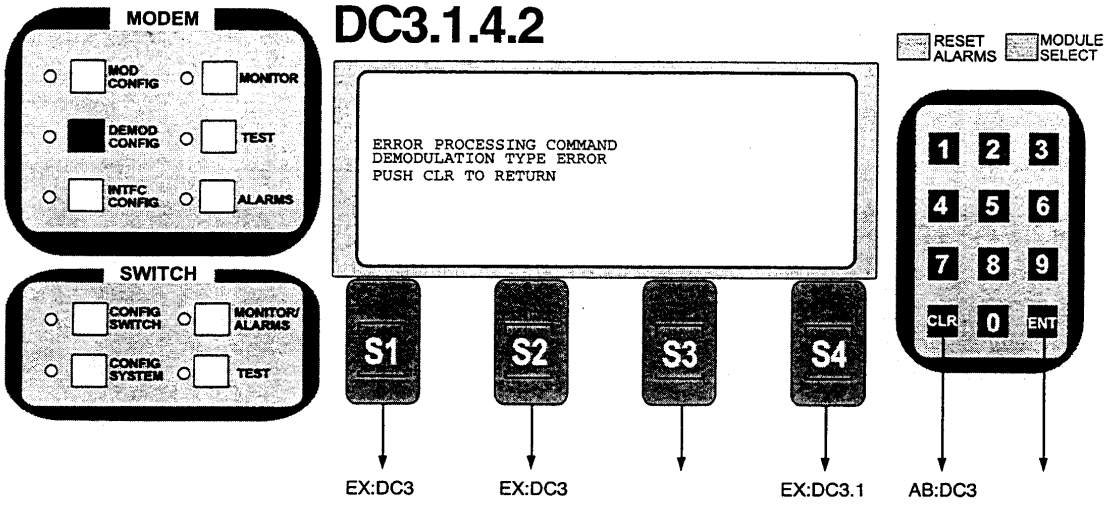
NOTE: This screen indicates the new selection was not allowed.



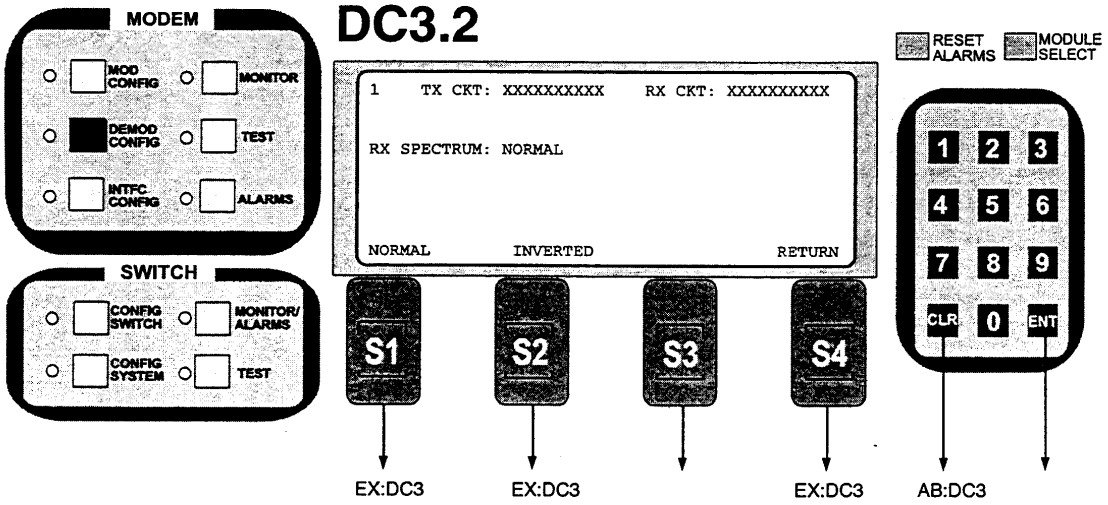


Note: Demodulation Type: Select BPSK, QPSK, 8PSK, NEXT.

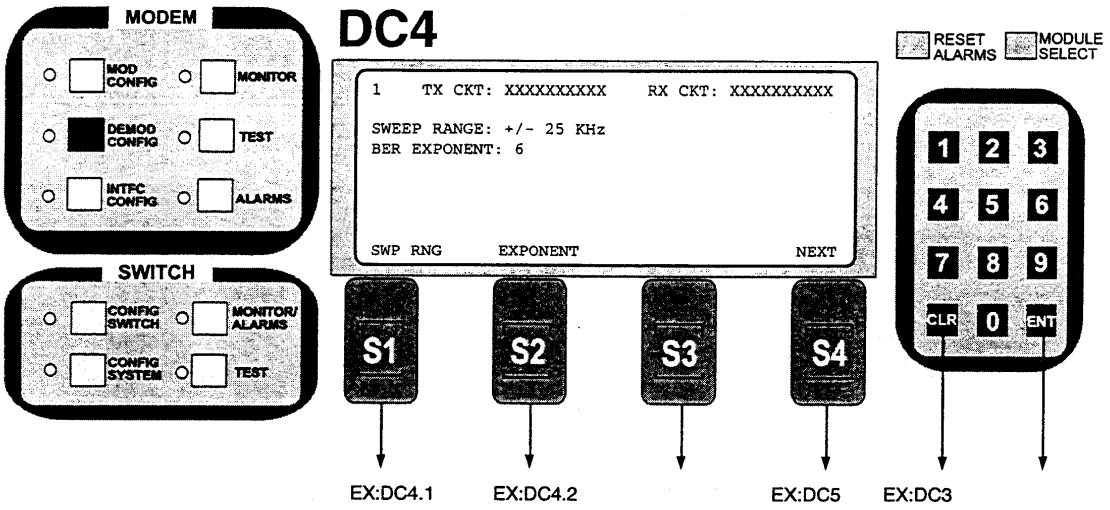




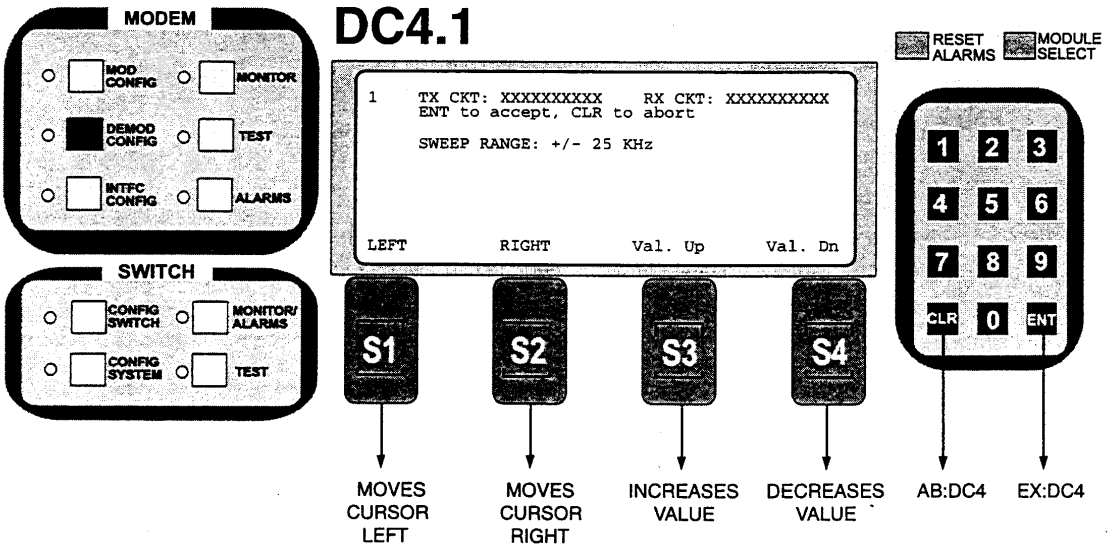
Note: This screen will appear if the Demodulation type is not installed or supported.



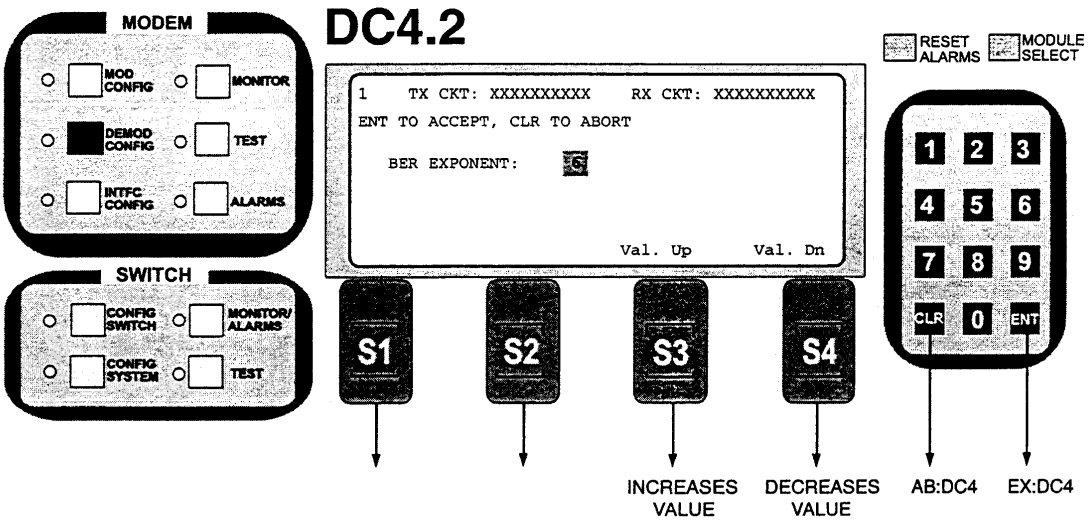
Note: Inverts the directions of rotation for PSK modulation. Normal meets IESS specification.



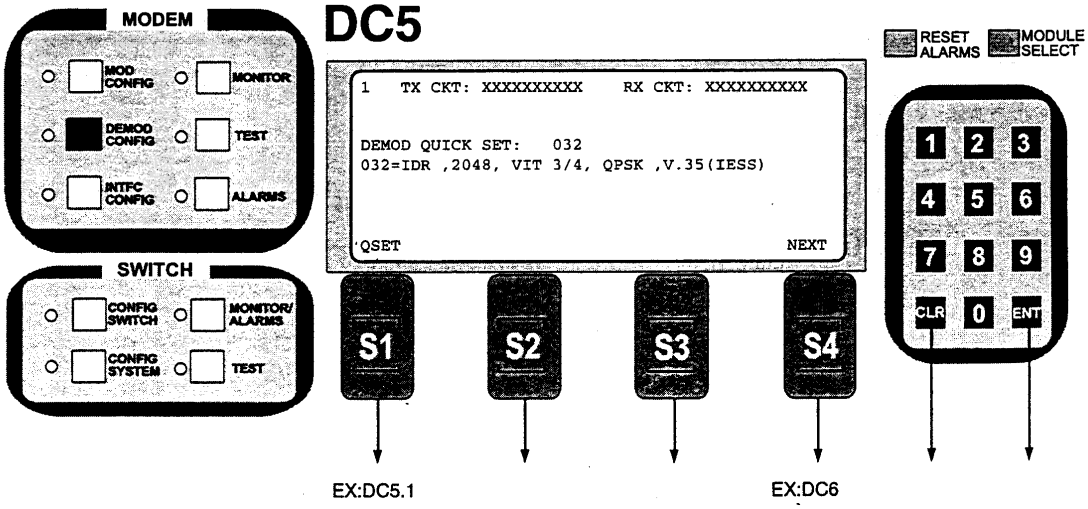
Note: Sets the parameters for the Demodulator Acquisition range and BER Exponent for Viterbi and Sequential.



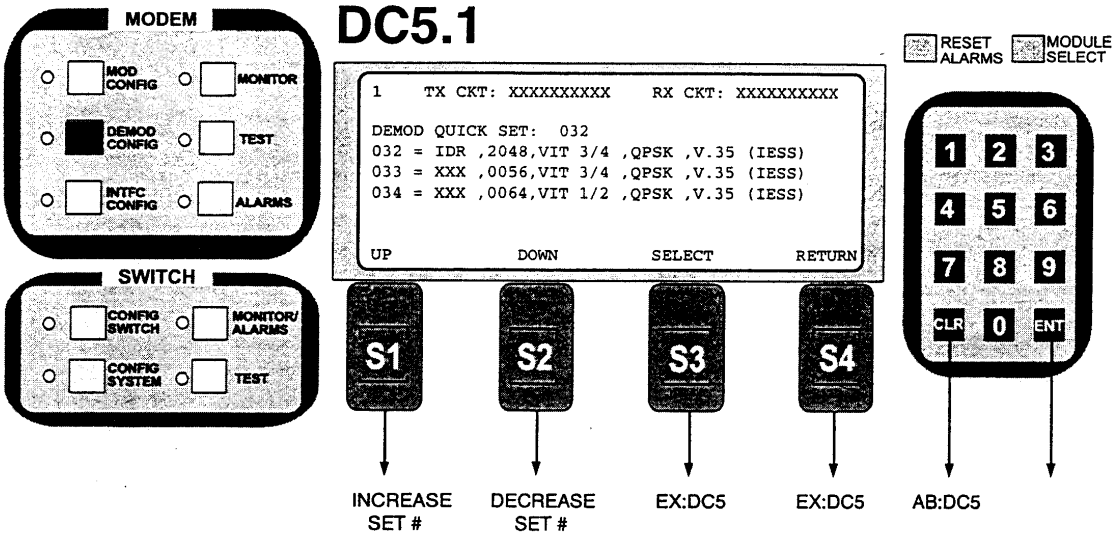
Note: Sweep Range: Level is entered in KHz from 0 - 25 KHz.



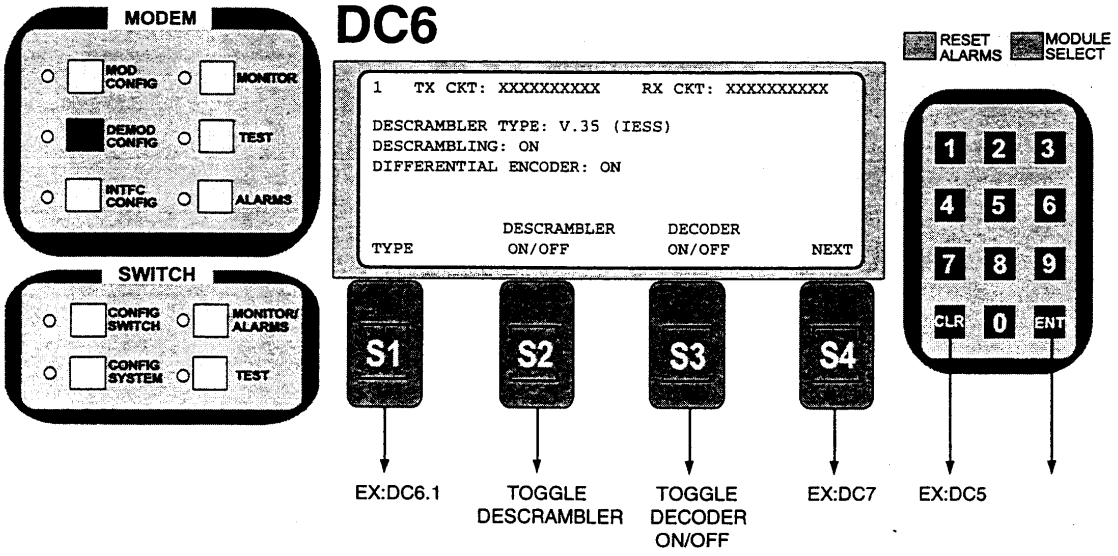
Note: BER Exponent: Sets the time base for the channel error rate measurement. This is used to estimate the Eb/No. Enter new value from 6 to 8 in Viterbi or 5 to 9 in Sequential.



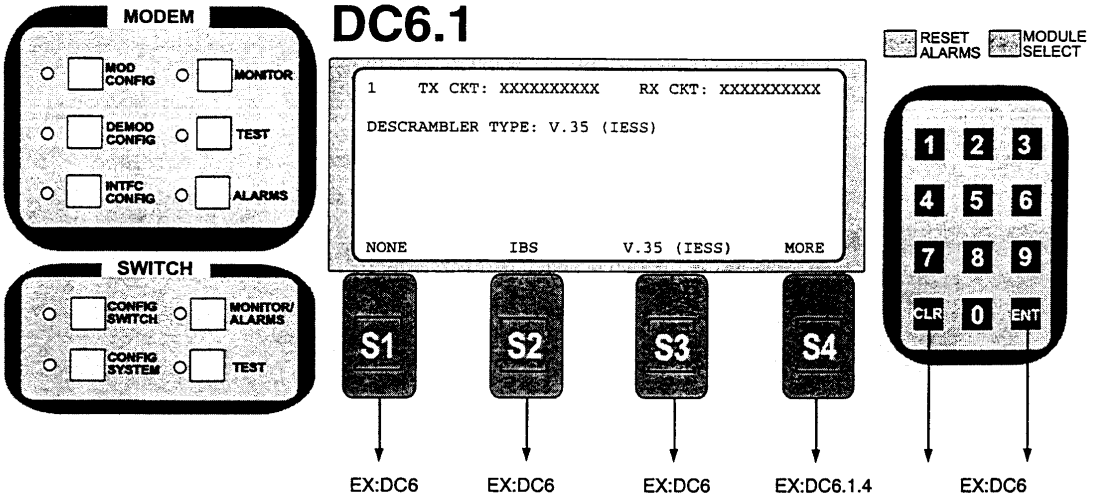
Note: Demod Quick Set (QSET). A preassigned number that sets many modem parameters such as Data Rate, Code Rate, Mode, Framing Type, Scrambler Type and Spectral Mask. Referring to Table 3-2, "RCS10 Strap Codes," if you know the strap code, enter it using the keypad and enter. Also, if you enter the new strap code and depress S3 - Select, the existing strap code will be selected, not the new entry.



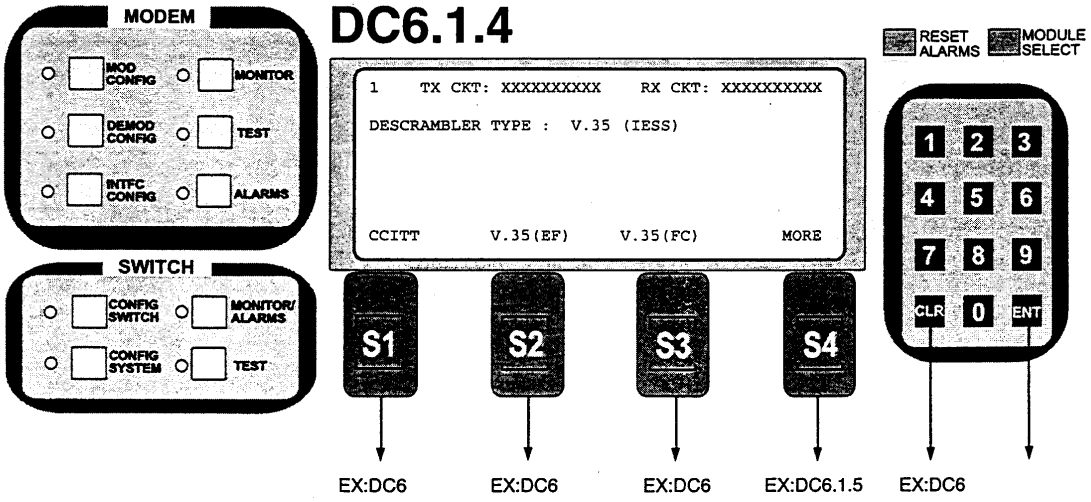
Note: Demod Quick Set. A preassigned number that sets many modem parameters such as Data Rate, Code Rate, Mode, Framing Type, Scrambler Type and Spectral Mask. Referring to Table 3-2, "RCS10 Strap Codes," if you know the strap code, enter it using the keypad and then ENTER. Also, if you enter the new strap code and depress S3 - Select, the existing strap code will be selected, not the new entry.



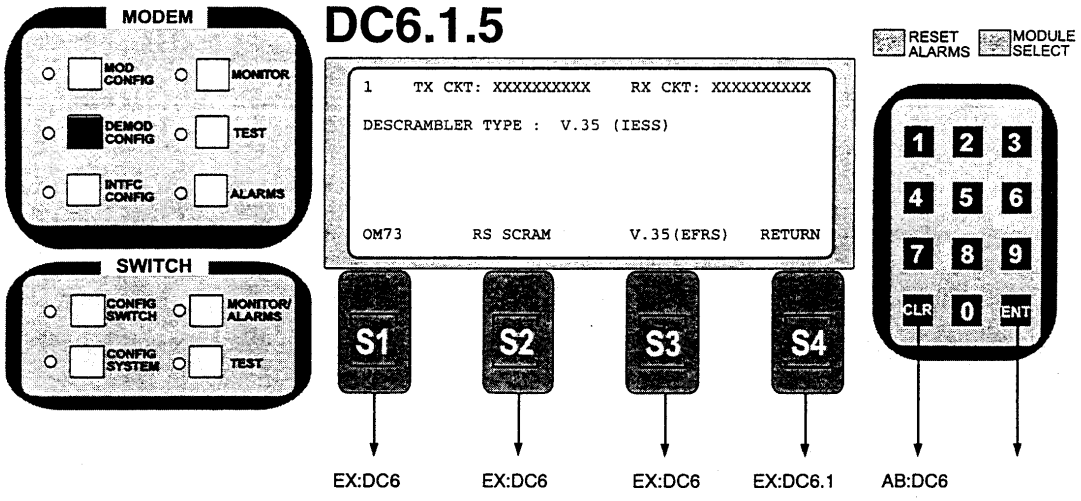
Descrambler On/Off: Turns Descrambler On or OFF.
Decoder On/Off: Enables or Disables Differential Decoder



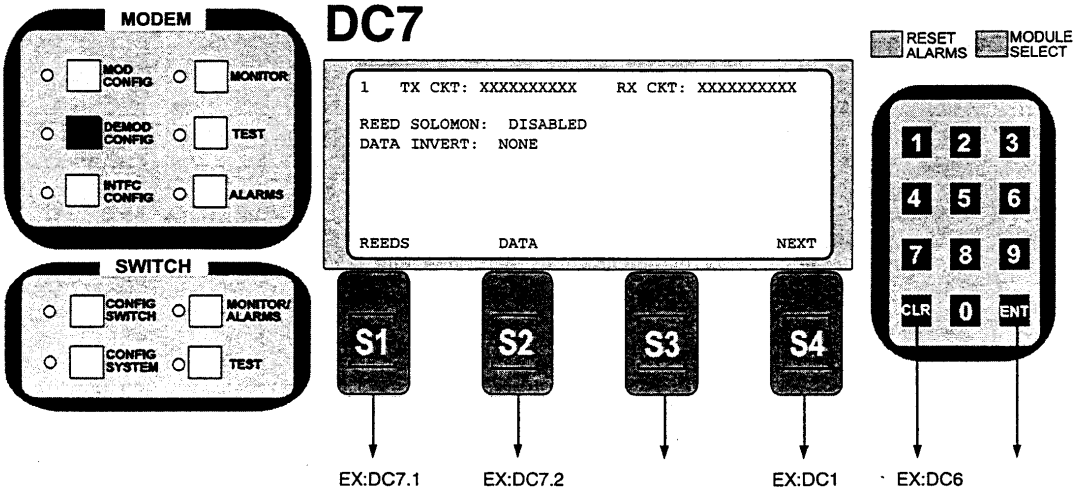
Note: Descrambler Type: Select None, IBS or V.35 (IESS).

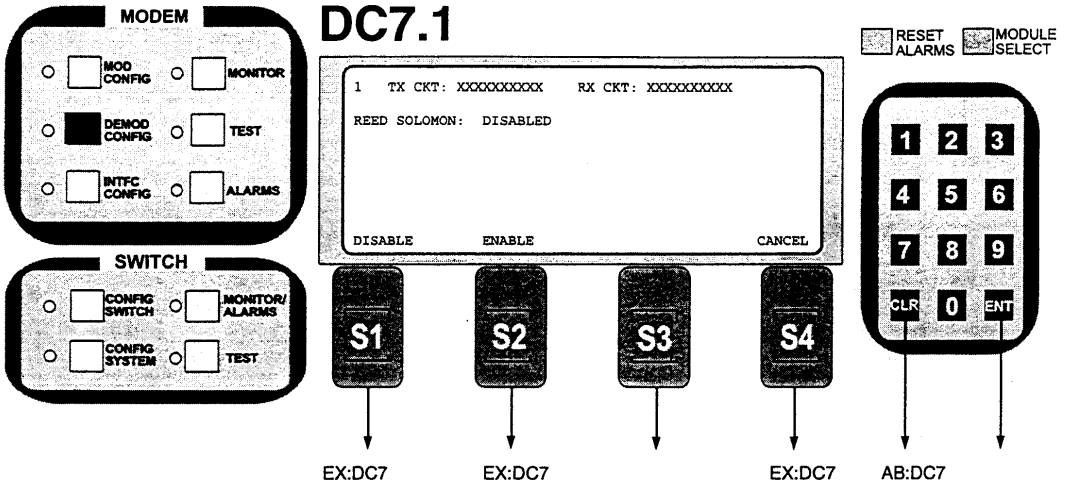


Note: Descrambler Type: Select CCITT, V.35(EF), V.35(FC) or go to the next screen for more choices.

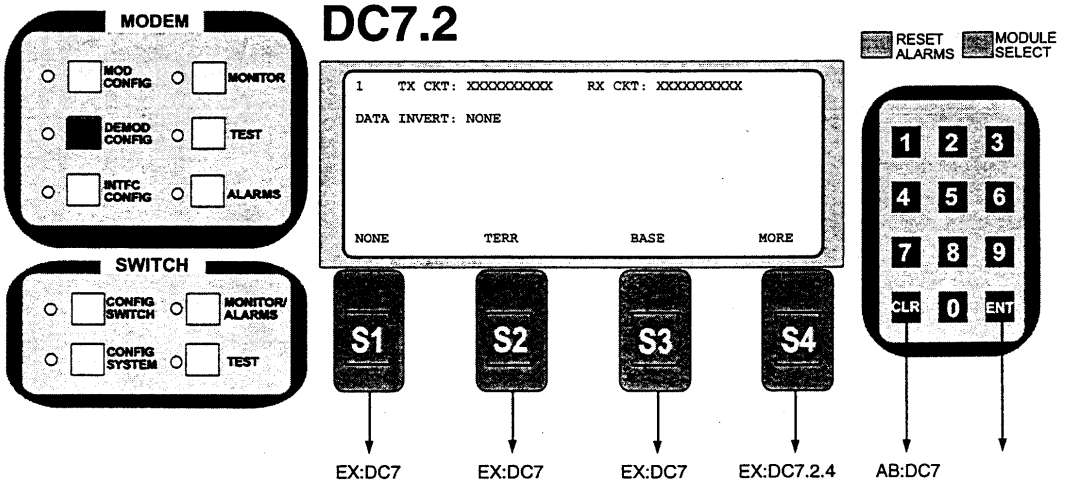


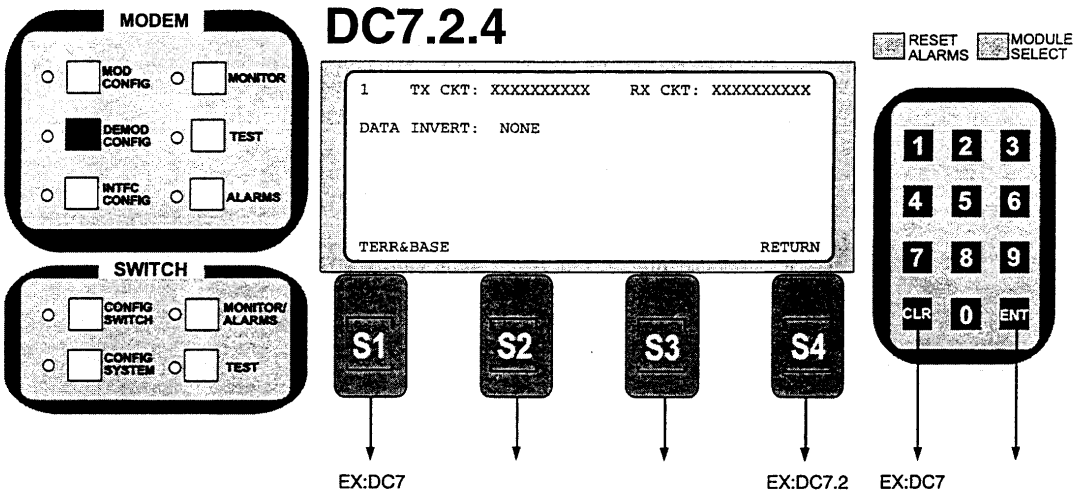
Note: Descrambler Type: Select OM73, RS SCRAM, V.35 (EFRS).

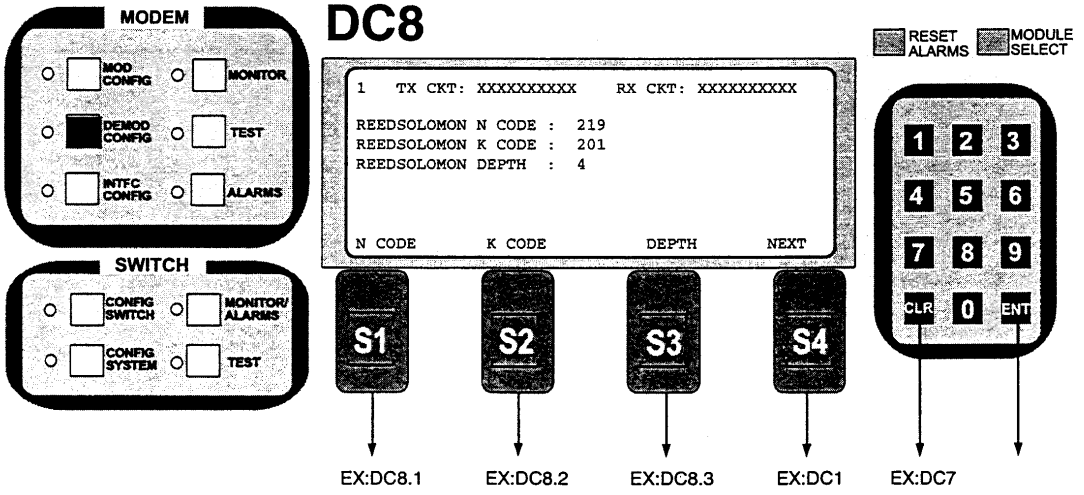


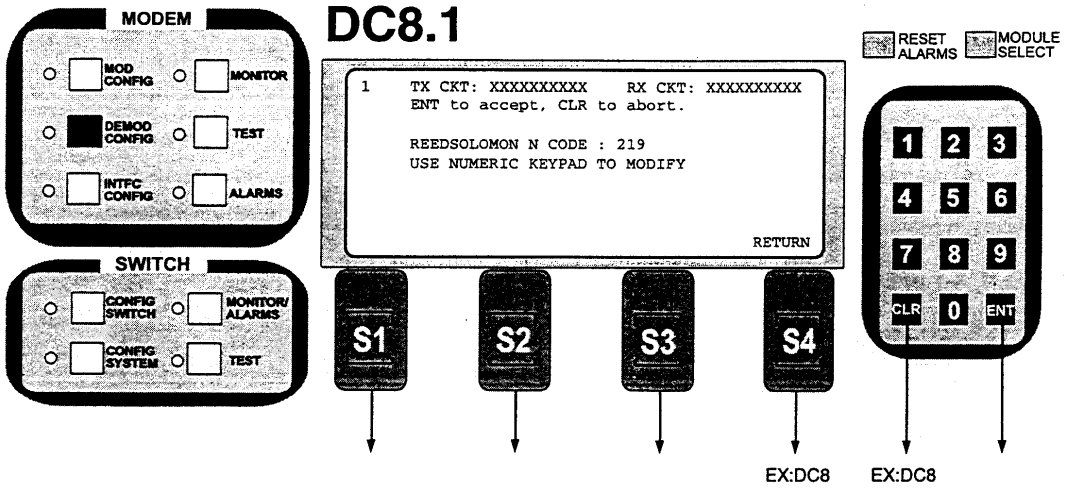


Note: Reed Solomon: Enable or Disable Reed Solomon Encoder. If the Reed-Solomon Encoder is Enabled, S4 will move you to DC8.

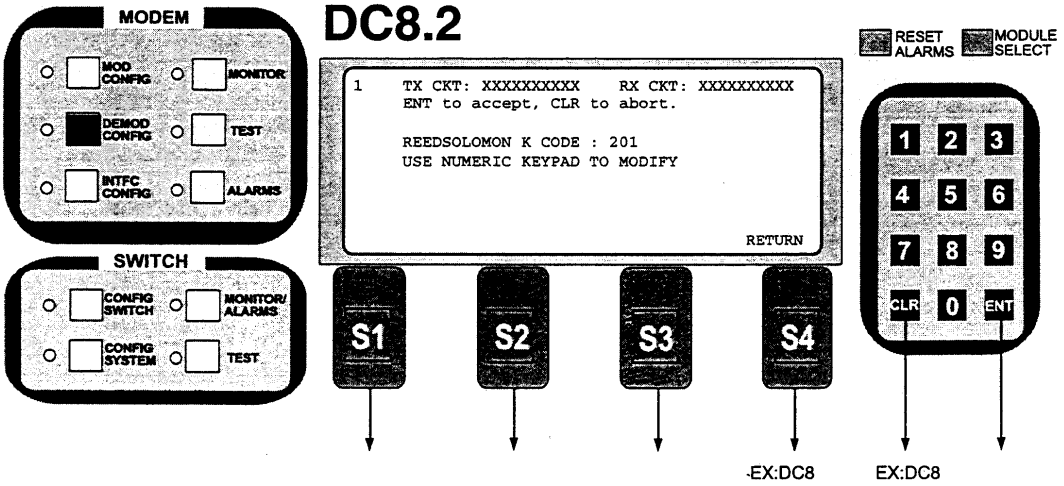



DC7.2.4
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
1 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
DATA INVERT: NONE
TERR&BASE
RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:DC7
EX:DC7.2
EX:DC7

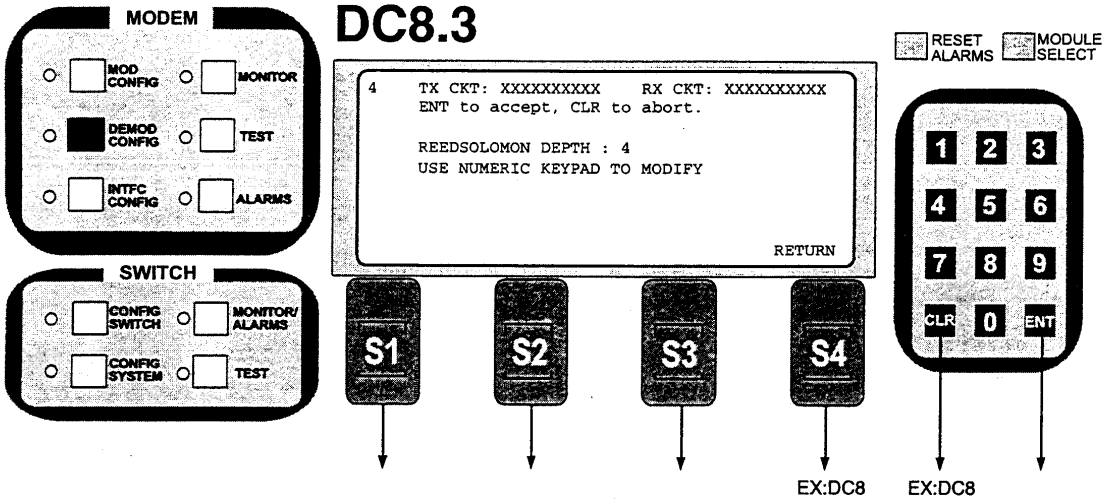

DC8
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
1 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
REEDSOLOMON N CODE : 219
REEDSOLOMON K CODE : 201
REEDSOLOMON DEPTH : 4
N CODE
K CODE
DEPTH
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:DC8.1
EX:DC8.2
EX:DC8.3
EX:DC1
EX:DC7



Note: Reed-Solomon Codes: Displays the currently used n and k Reed-Solomon codes. In closed net mode, custom RS codes may be selected.



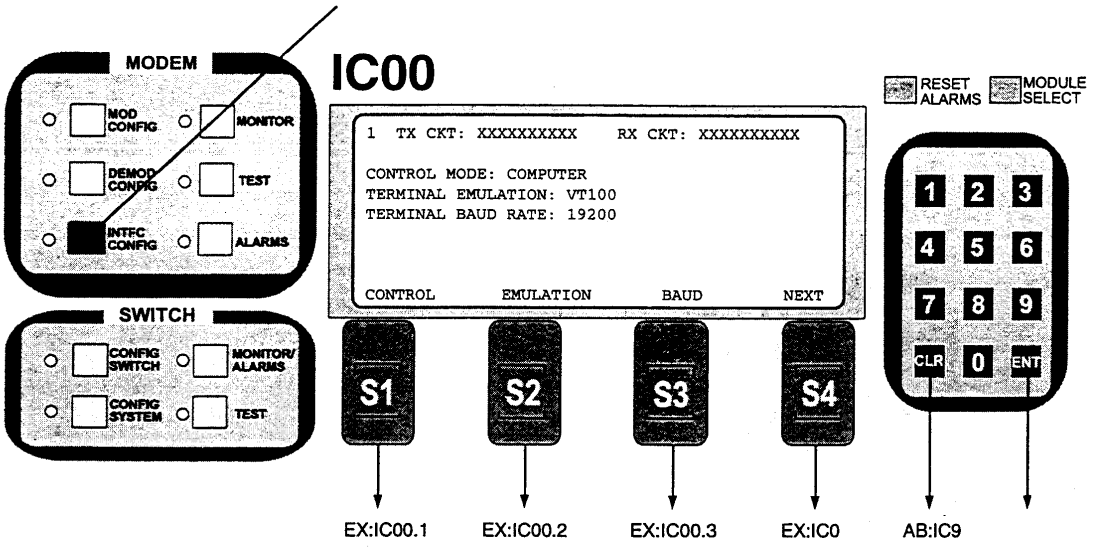
Note: Reed-Solomon Codes: Displays the currently used n and k Reed-Solomon codes. In closed net mode, custom RS codes may be selected.



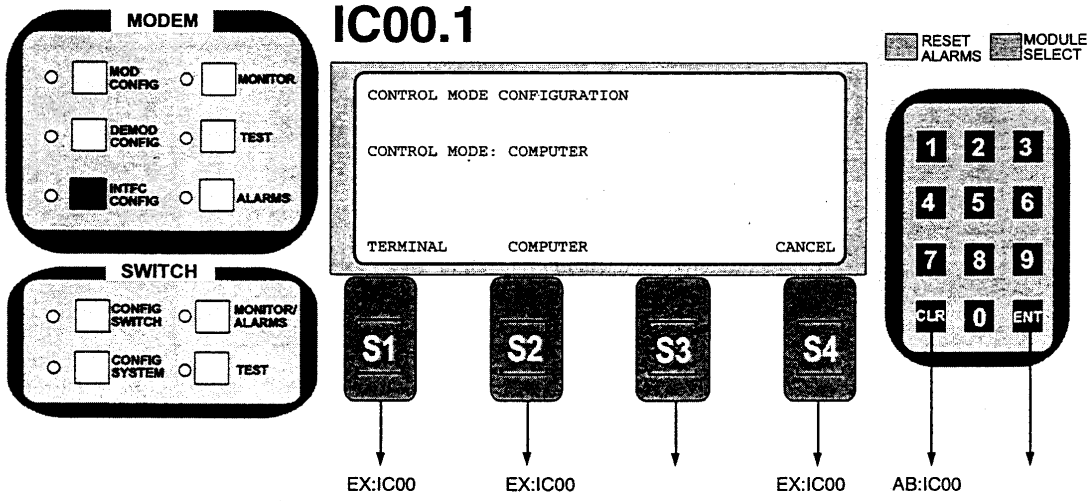
Note: Reed-Solomon Depth: Displays the currently used Reed-Solomon interleaver depth. In Closed Mode, Depth = 8 or 4 may be selected.

3.11 RCS10 Interface Configuration Front Panel Menu Screens

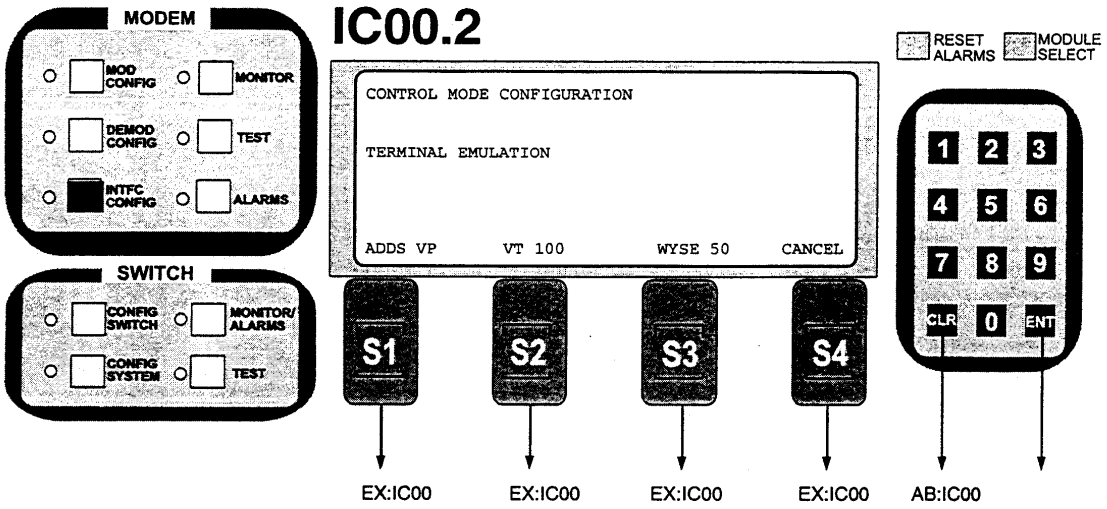
The following screens are accessed by depressing the INTFC CONFIG button located in the Modem section of the RCS10 on the top left of the front panel.

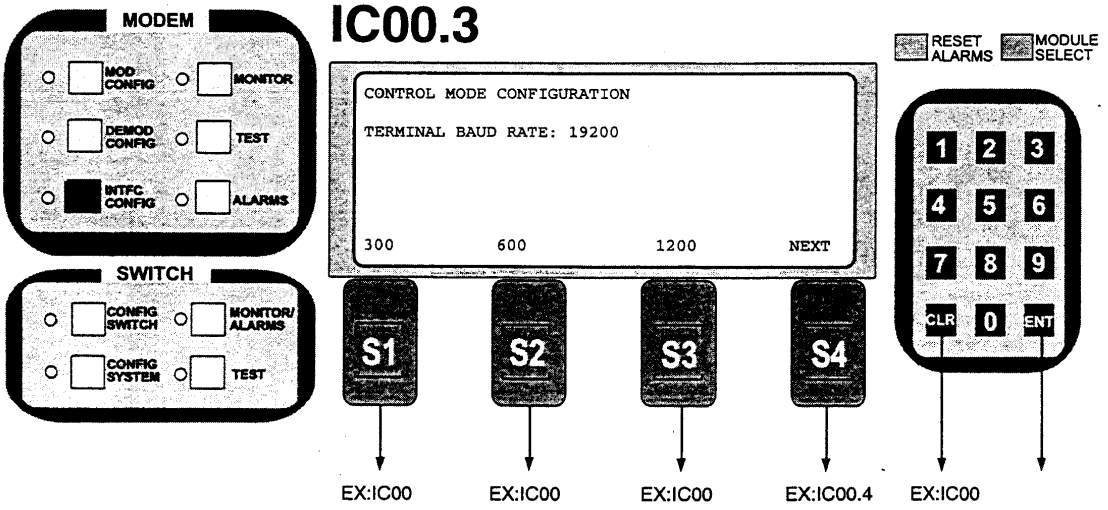


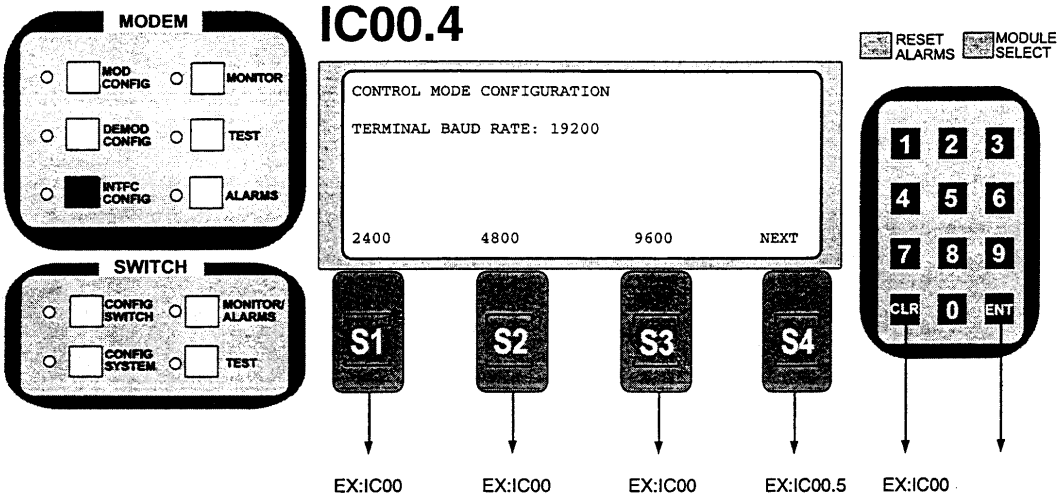
NOTE: Select Control Mode, Terminal Emulation or Terminal Baud Rate.

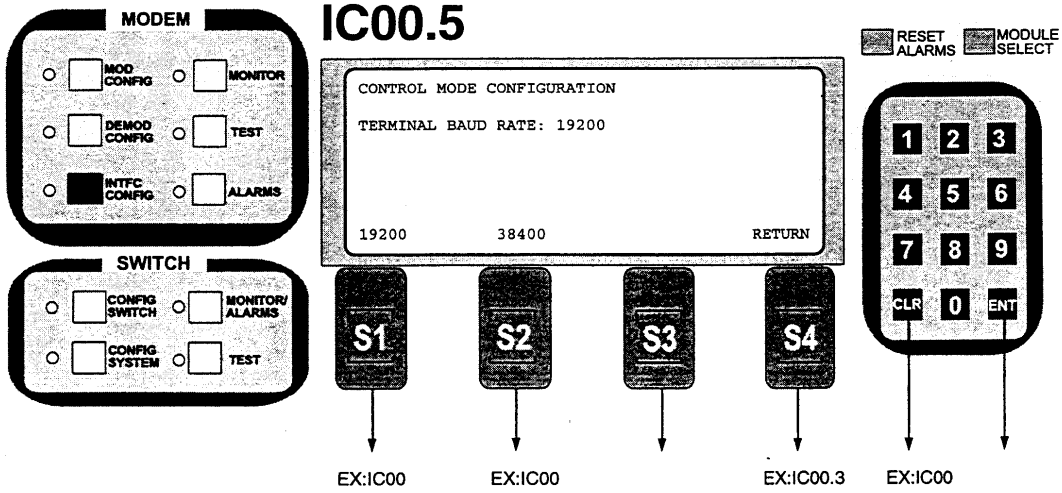


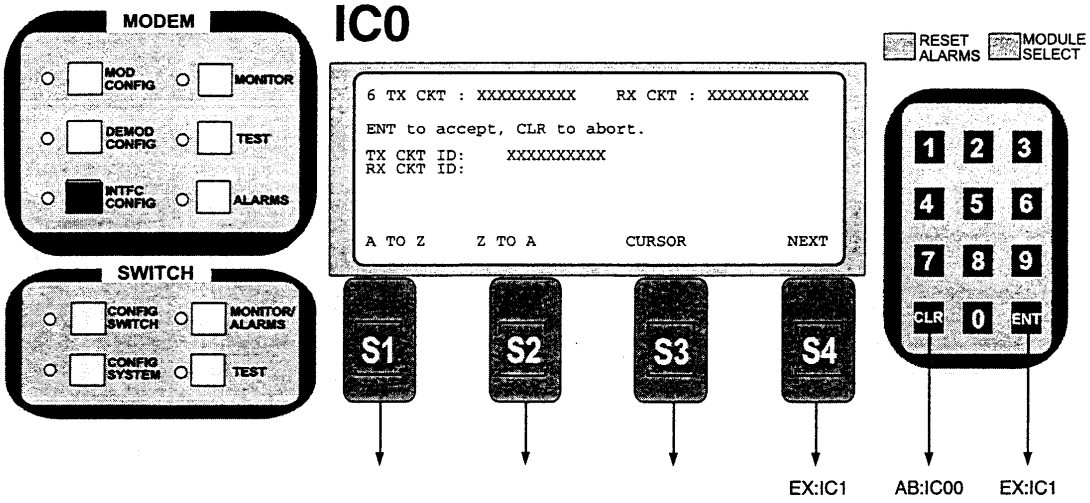
Note: Control Mode: Select Control Mode of the DMD10 Modem.
Terminal: Dumb terminal connected to the front of the Modem.
Computer: Switch or Remote M&C.


IC00.2
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
CONTROL MODE CONFIGURATION
TERMINAL EMULATION
ADDS VP
VT 100
WYSE 50
CANCEL
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC00
EX:IC00
EX:IC00
EX:IC00
AB:IC00

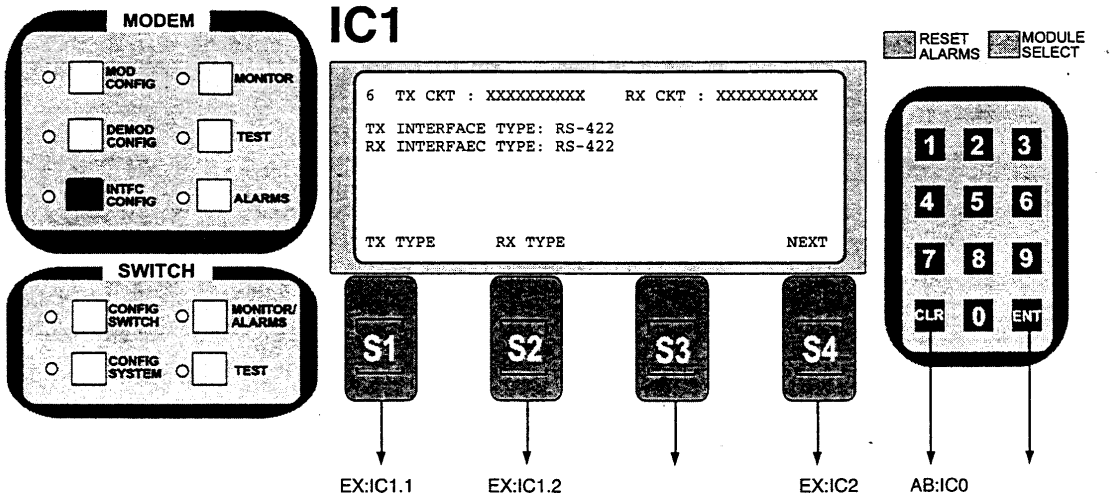

IC00.3
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
CONTROL MODE CONFIGURATION
TERMINAL BAUD RATE: 19200
300
600
1200
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC00
EX:IC00
EX:IC00
EX:IC00.4
EX:IC00


IC00.4
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
CONTROL MODE CONFIGURATION
TERMINAL BAUD RATE: 19200
2400
4800
9600
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC00
EX:IC00
EX:IC00
EX:IC00.5
EX:IC00

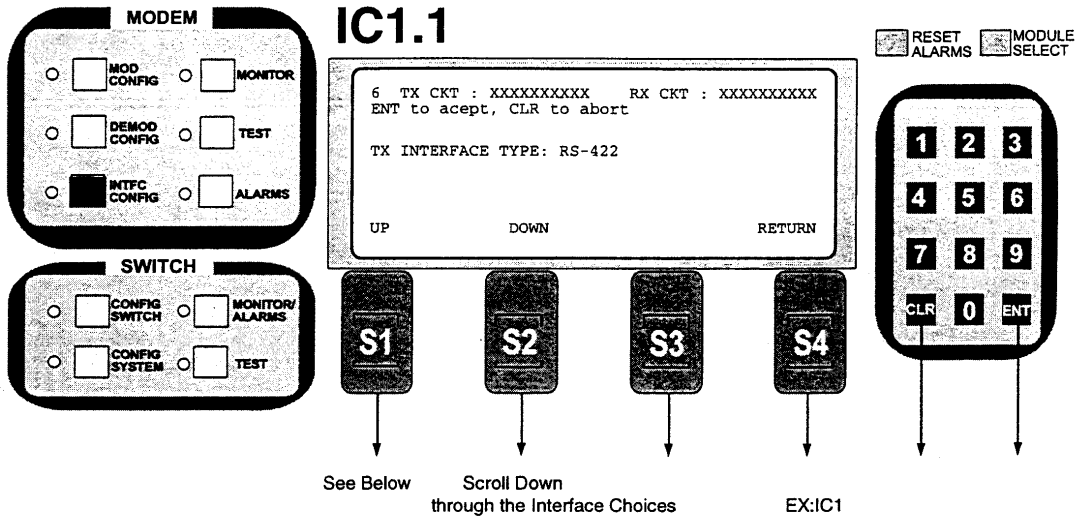

IC00.5
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
CONTROL MODE CONFIGURATION
TERMINAL BAUD RATE: 19200
19200
38400
RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC00
EX:IC00
EX:IC00.3
EX:IC00



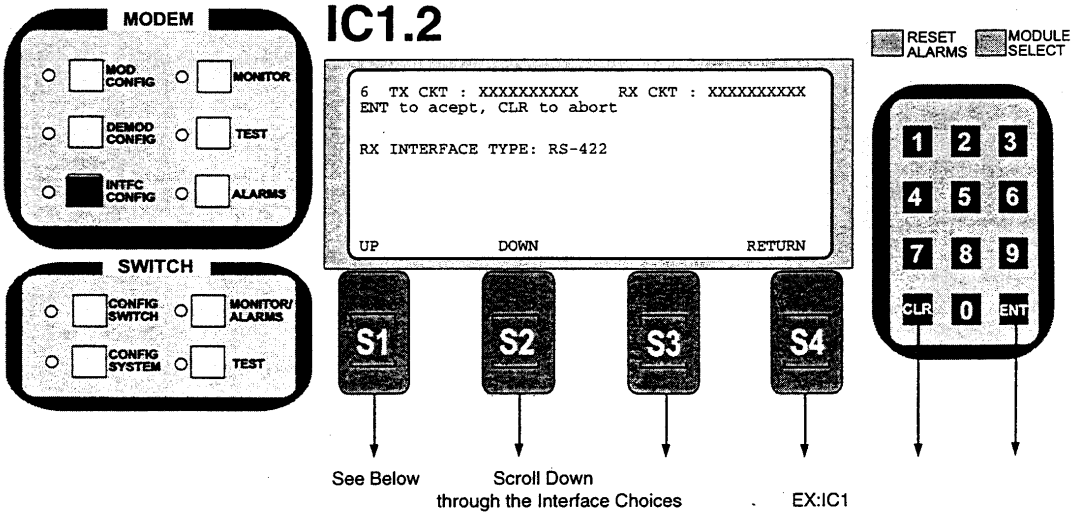
Note: Provides entry of Tx or Rx Circuit identifier. Circuits can be given up to a 10 character alphanumeric identity, such as LINK 1. Use keypad to enter numeric digits. The first time ENT is depressed, information for the TX CKT ID is entered and the cursor moves to RX CKT ID. The second time ENT is depressed, information for the RX CKT ID is entered and the cursor moves back to the TX CKT ID.



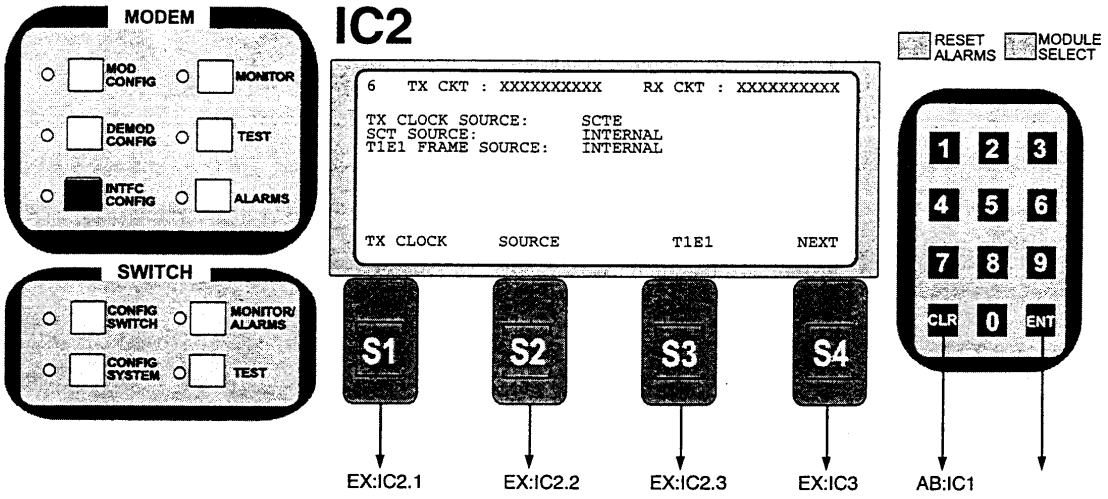
Note: Tx Interface Types that may be selected: RS-422, V.35, RS-232, G703BT1AMI, G703BT1B8ZS, G.703.B.E1, G.703.B.T2, G.703.U.E1, G.703.U.T2, G.703.U.E2.

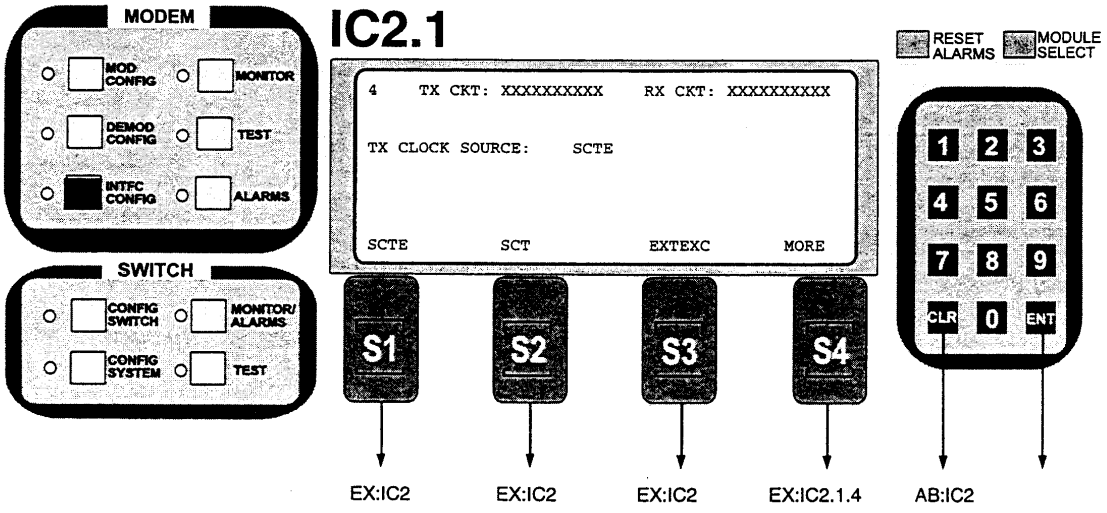


Note: Tx Interface Types that may be selected: RS-422, V.35, RS-232, G703BT1AMI, G703BT1B8ZS, G.703.B.E1, G.703.B.T2, G.703.U.E1, G.703.U.T2, G.703.U.E2.

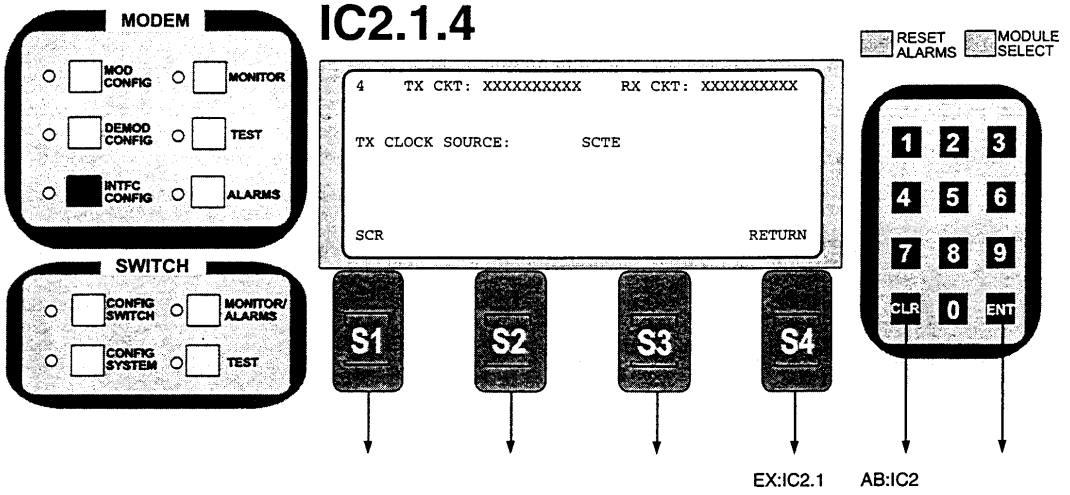


Note: Rx Interface Types that may be selected: RS-422, V.35, RS-232, G703BT1AMI, G703BT1B8ZS, G.703.B.E1, G.703.B.T2, G.703.U.E1, G.703.U.T2, G.703.U.E2.

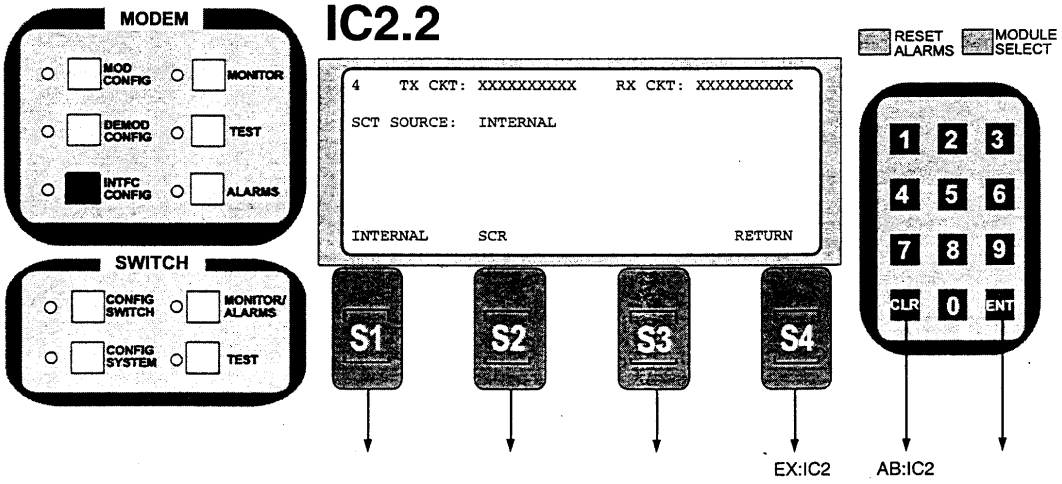




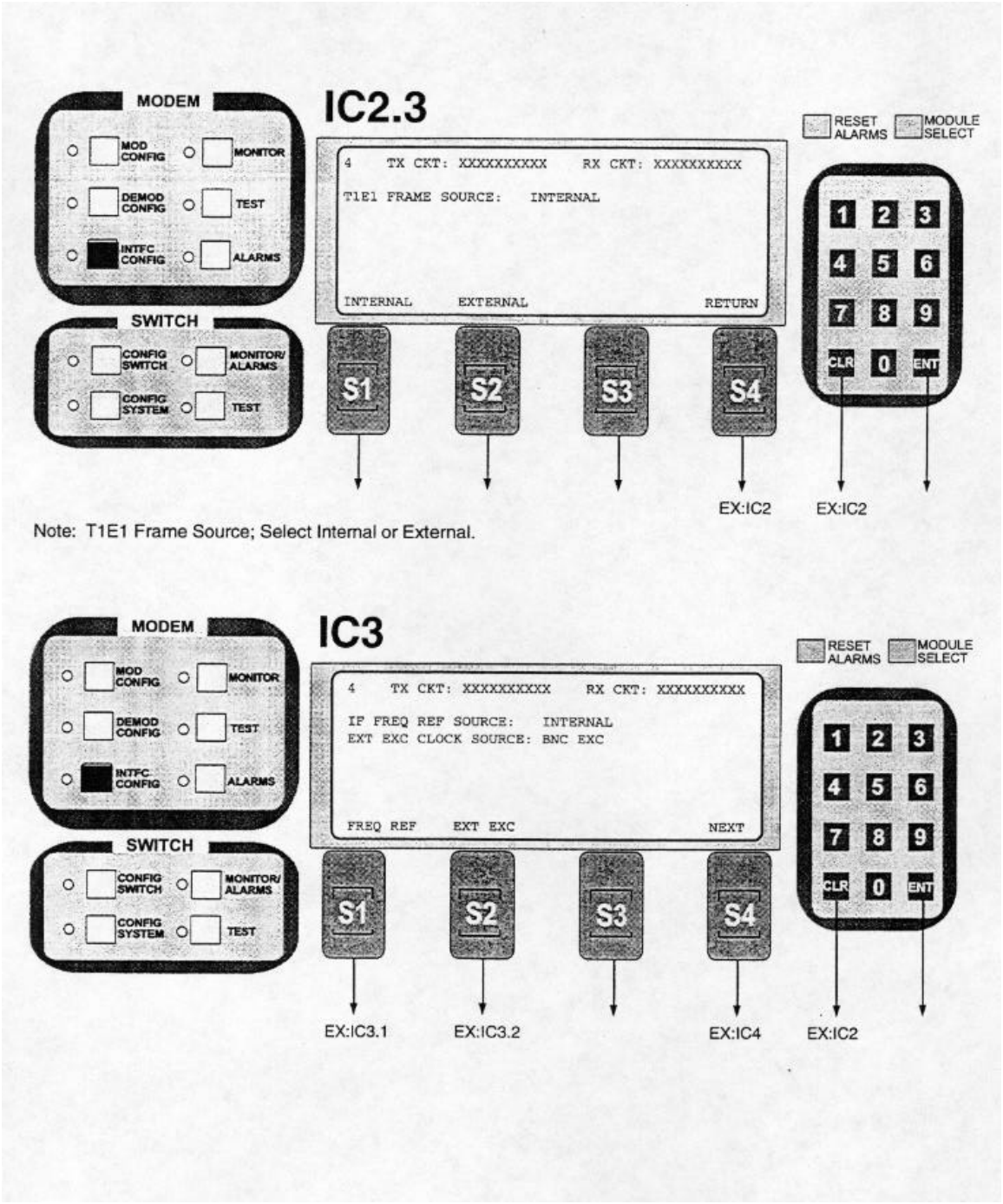
Note: TX Clock Source: Select TX Clock Source SCTE, SCT, EXT EXC, or SCR. When using G.703 Interface Type, SCTE is the only valid TX Clock Source.

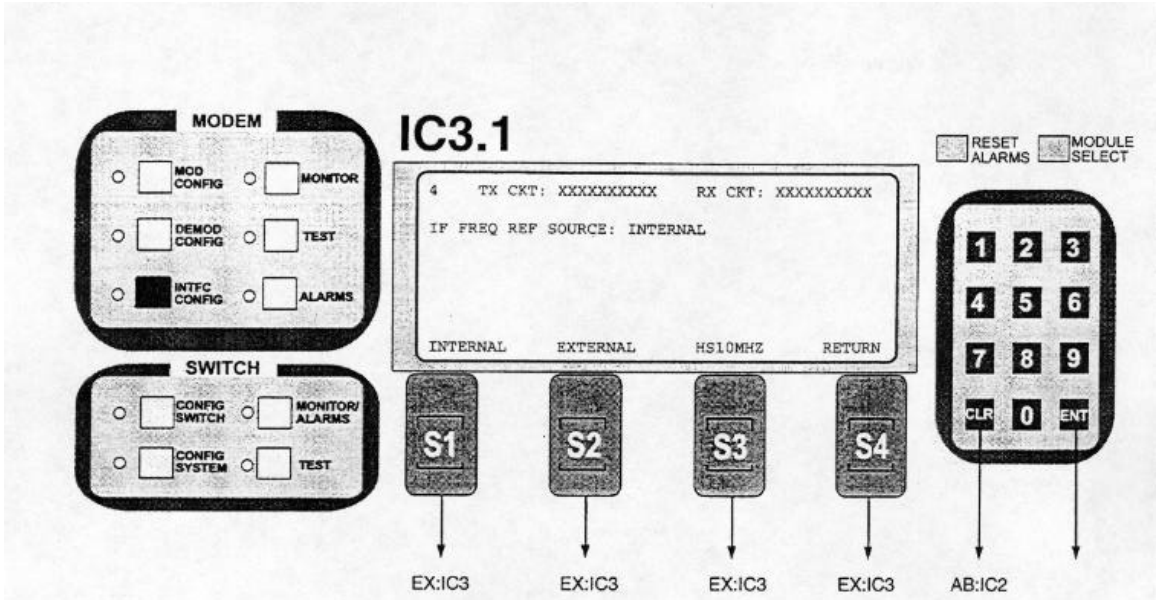


Note: Tx Clock Source: Select Tx Clock Source SCTE, SCT, EXT EXC or SCR. When using G.703 Interface, SCTE is the only valid Clock Source.

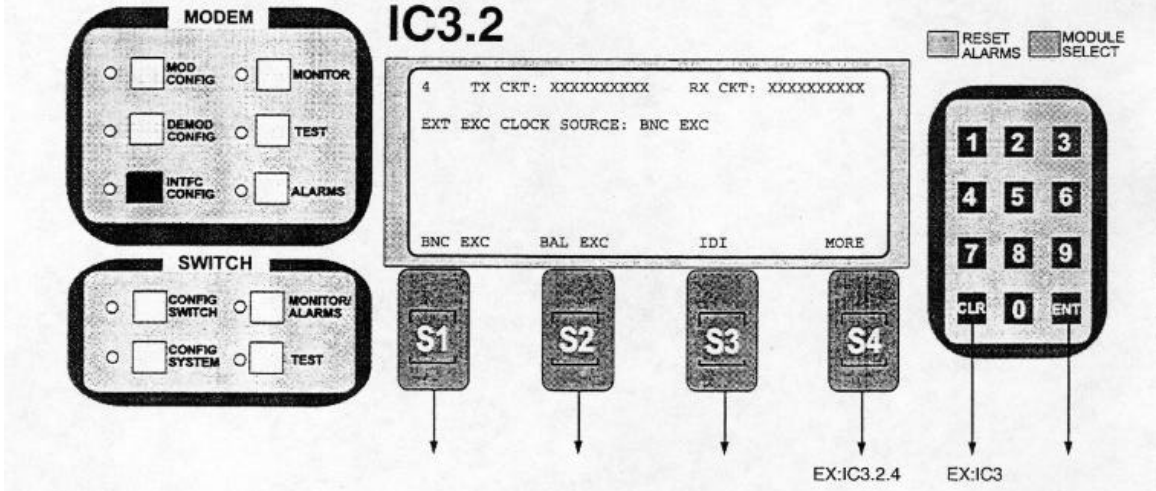


Note: SCT Source: Select Internal or SCR.

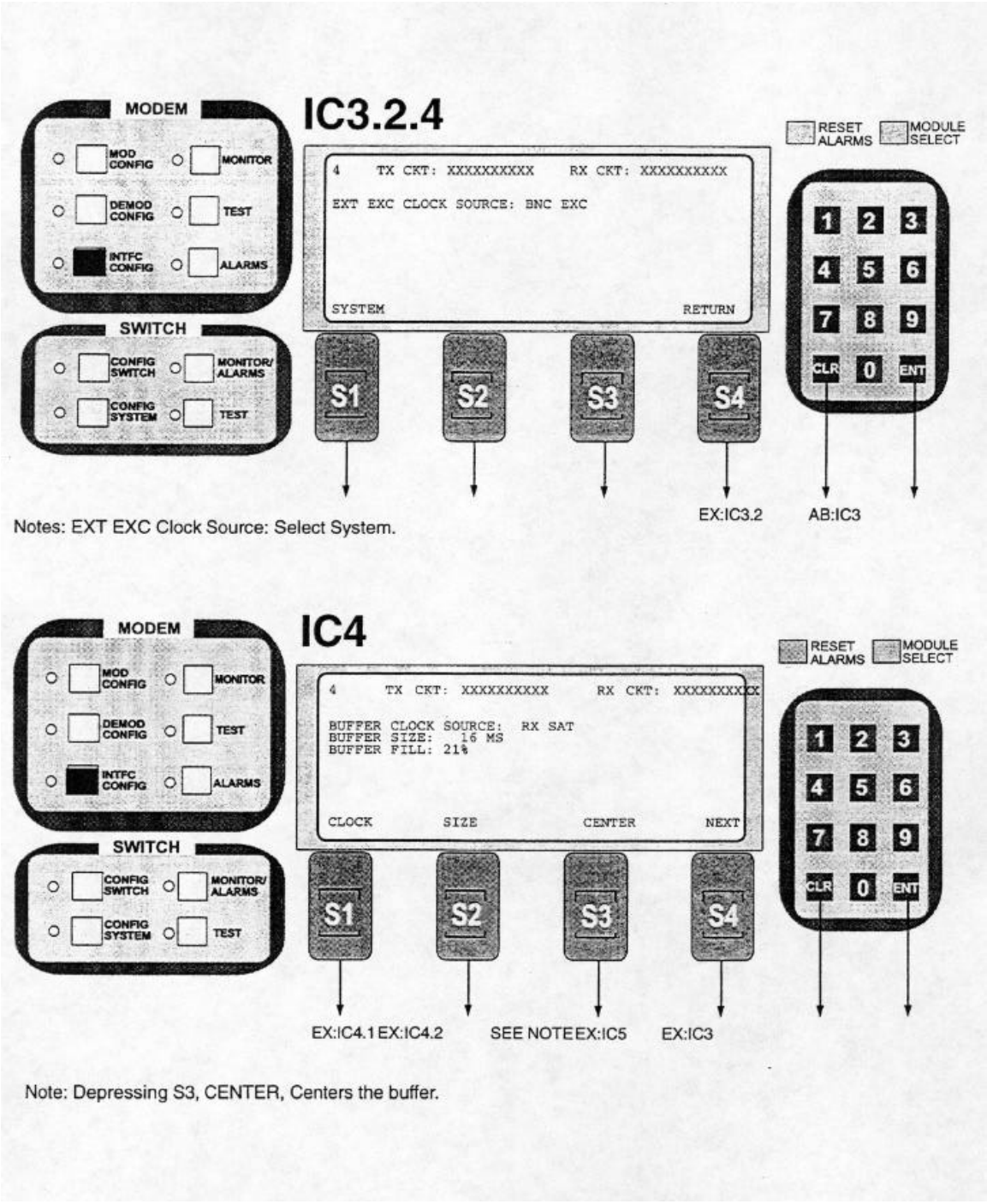

MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
IC2.3
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
T1E1 FRAME SOURCE: INTERNAL
INTERNAL EXTERNAL RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC2
EX:IC2
Note: T1E1 Frame Source; Select Internal or External.
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
IC3
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
IF FREQ REF SOURCE: INTERNAL
EXT EXC CLOCK SOURCE: BNC EXC
FREQ REF EXT EXC NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC3.1
EX:IC3.2
EX:IC4
EX:IC2

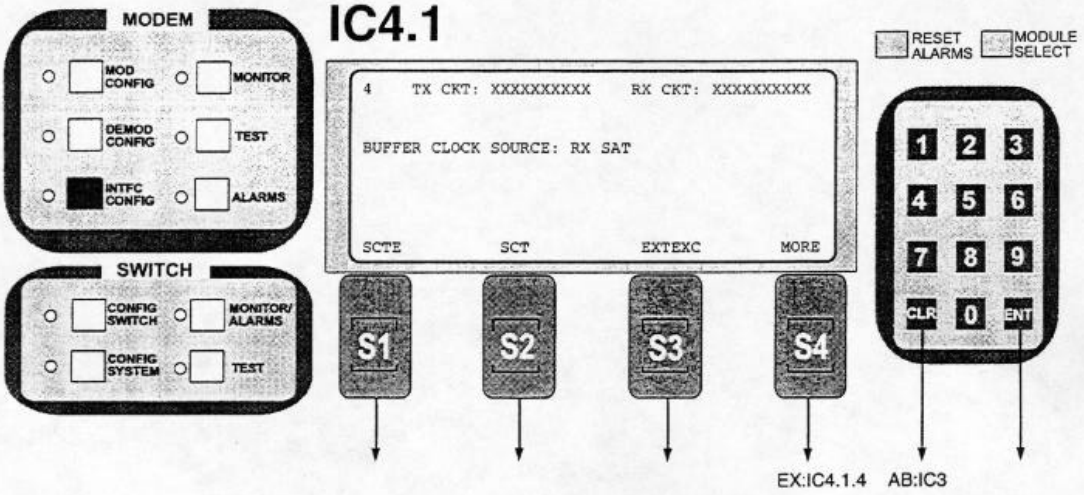


Notes: IF Freq Reference: Select Internal, External or High Stability 10 MHz.

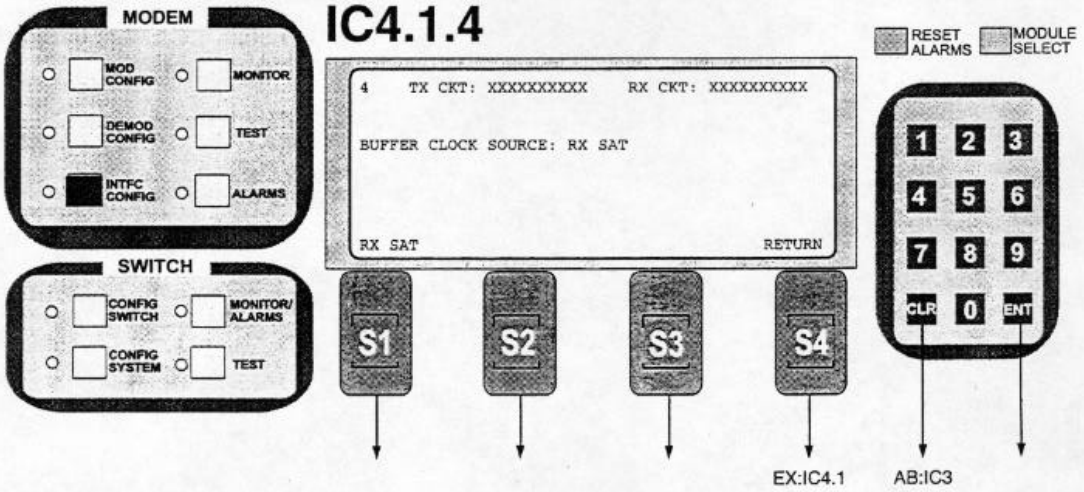


Notes: EXT EXC Clock Source: Select BNC EXC, BAL EXC or IDI.

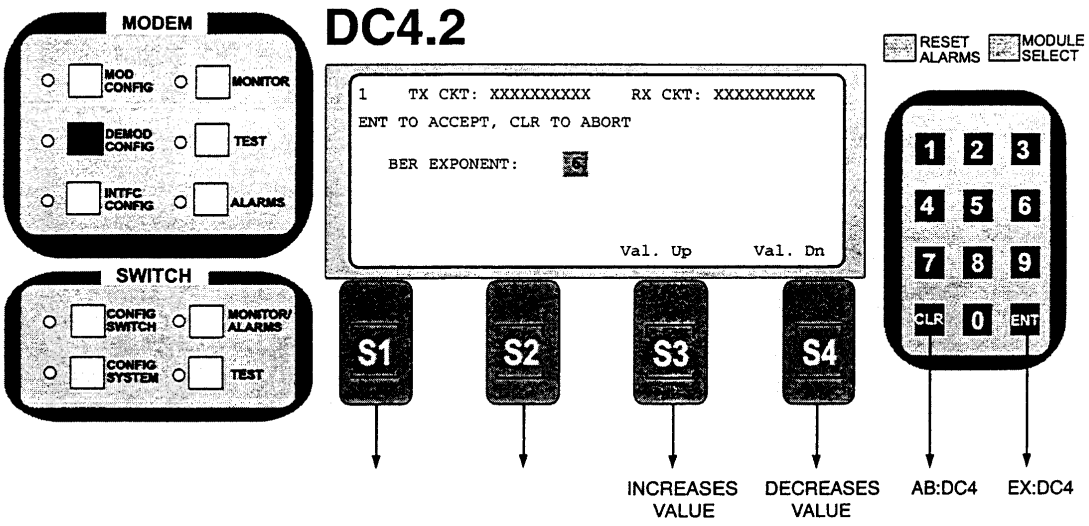

IC3.2.4
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
EXT EXC CLOCK SOURCE: BNC EXC
SYSTEM
RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC3.2
AB:IC3
Notes: EXT EXC Clock Source: Select System.
IC4
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
BUFFER CLOCK SOURCE: RX SAT
BUFFER SIZE: 16 MS
BUFFER FILL: 21%
CLOCK
SIZE
CENTER
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC4.1 EX:IC4.2
SEE NOTE EX:IC5
EX:IC3
Note: Depressing S3, CENTER, Centers the buffer.



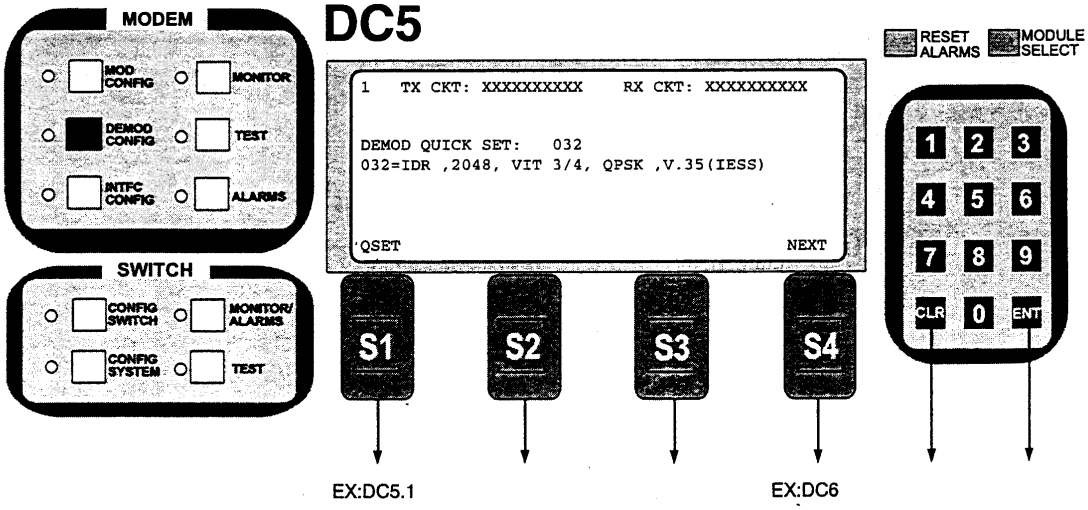
Note: Buffer Clock Source: Select SCTE, SCT, EXTEXC or RXSAT.



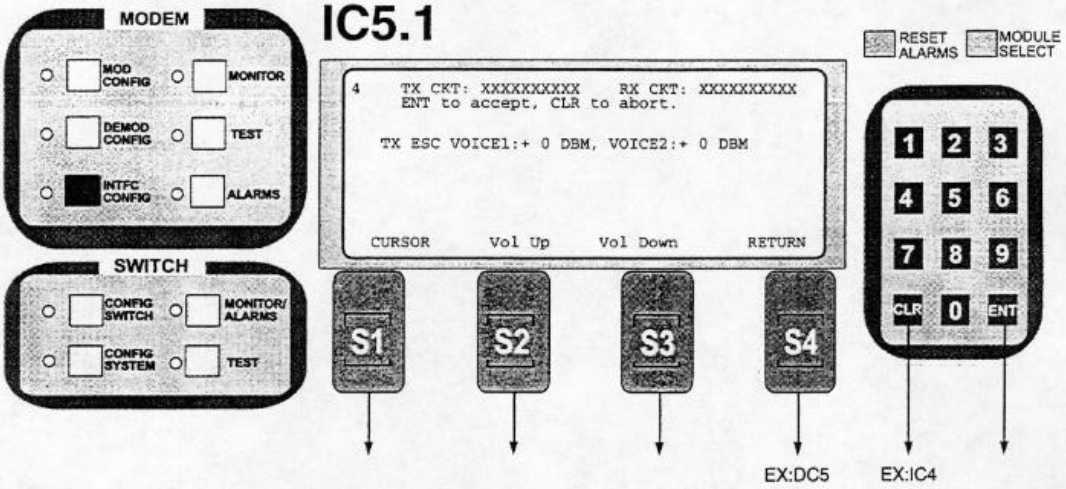
Note: Buffer Clock Source: Select SCTE, SCT, EXTEXC or RXSAT.



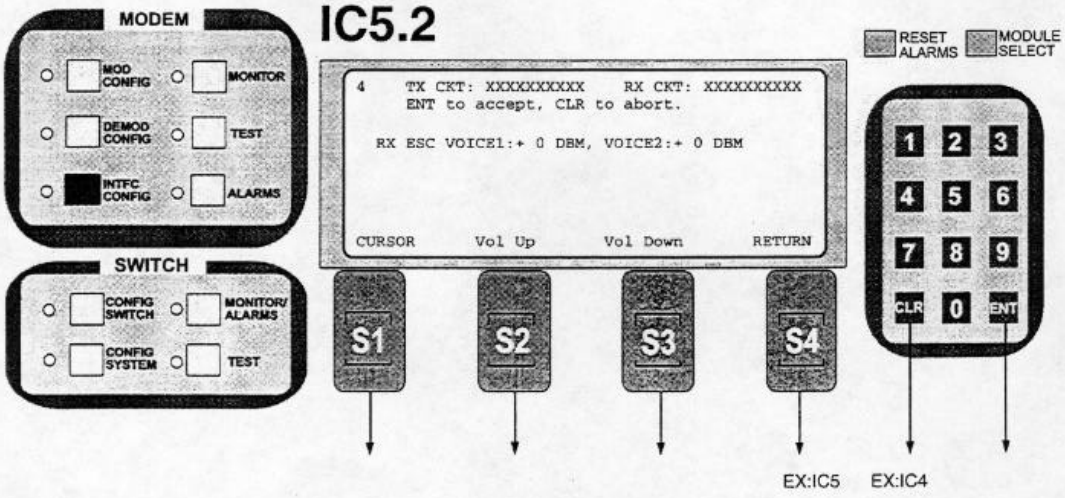
Note: BER Exponent: Sets the time base for the channel error rate measurement. This is used to estimate the Eb/No. Enter new value from 6 to 8 in Viterbi or 5 to 9 in Sequential.



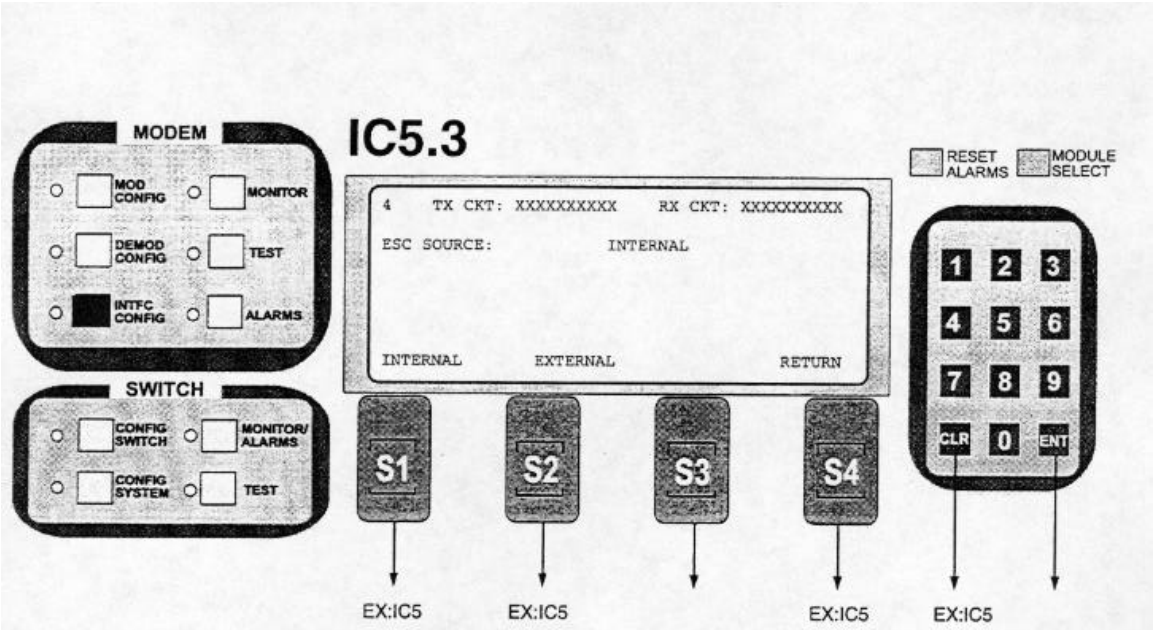
Note: Demod Quick Set (QSET). A preassigned number that sets many modem parameters such as Data Rate, Code Rate, Mode, Framing Type, Scrambler Type and Spectral Mask. Referring to Table 3-2, "RCS10 Strap Codes," if you know the strap code, enter it using the keypad and enter. Also, if you enter the new strap code and depress S3 - Select, the existing strap code will be selected, not the new entry.



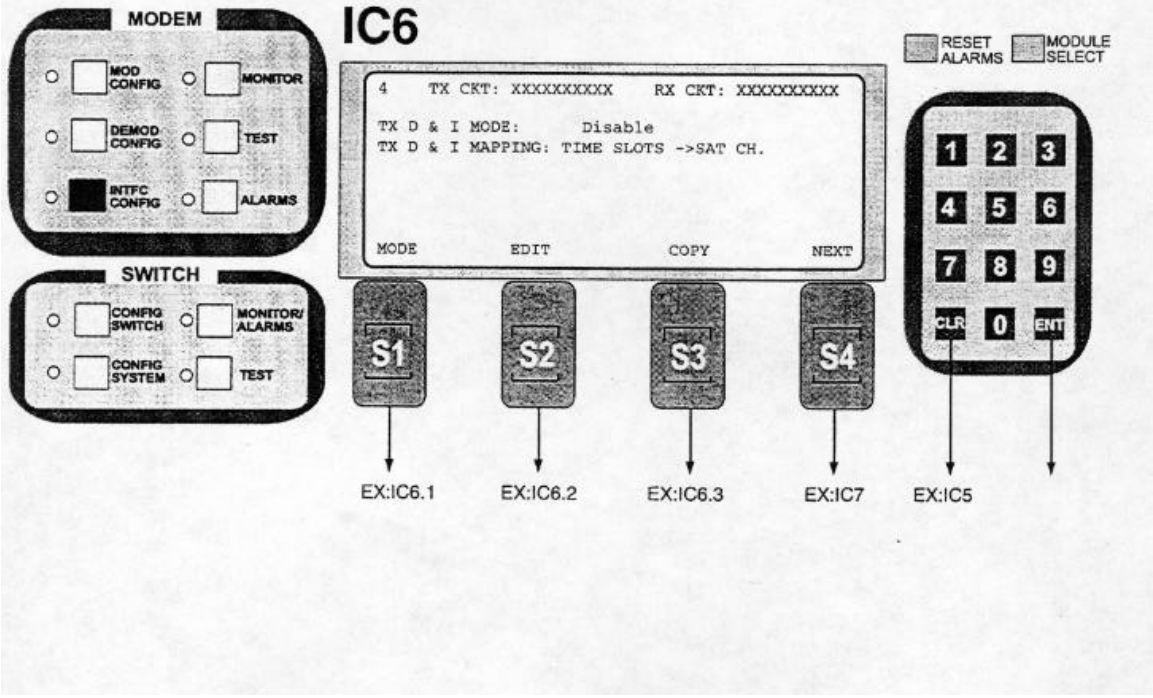
Note: TX ESC: Set ESC Channel 1 and Channel 2 volume. +10 to -20 dBm values are valid. Enter value using keypad, followed by Enter.

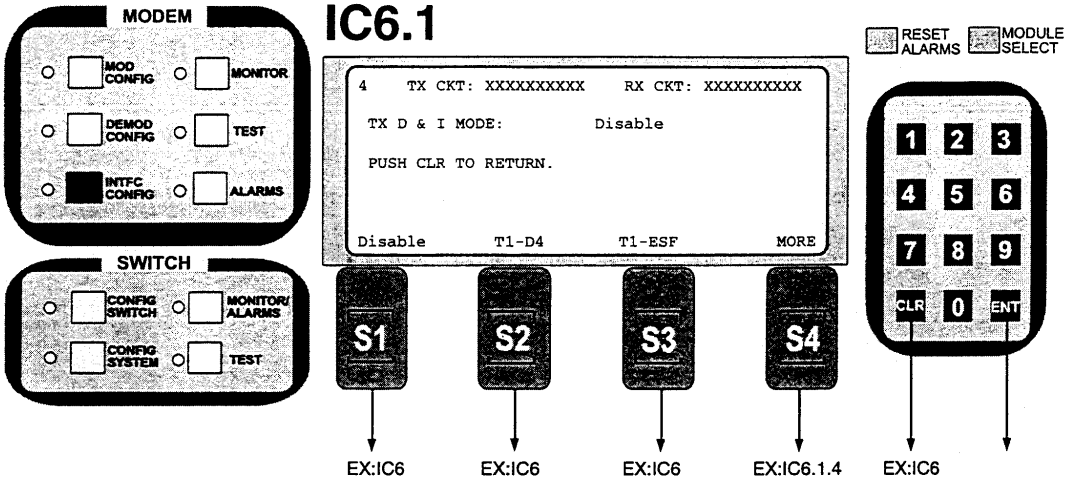


Note: RX ESC: Set ESC Channel 1 and Channel 2 volume. +10 to -20 dBm values are valid. Enter value using keypad, followed by Enter.

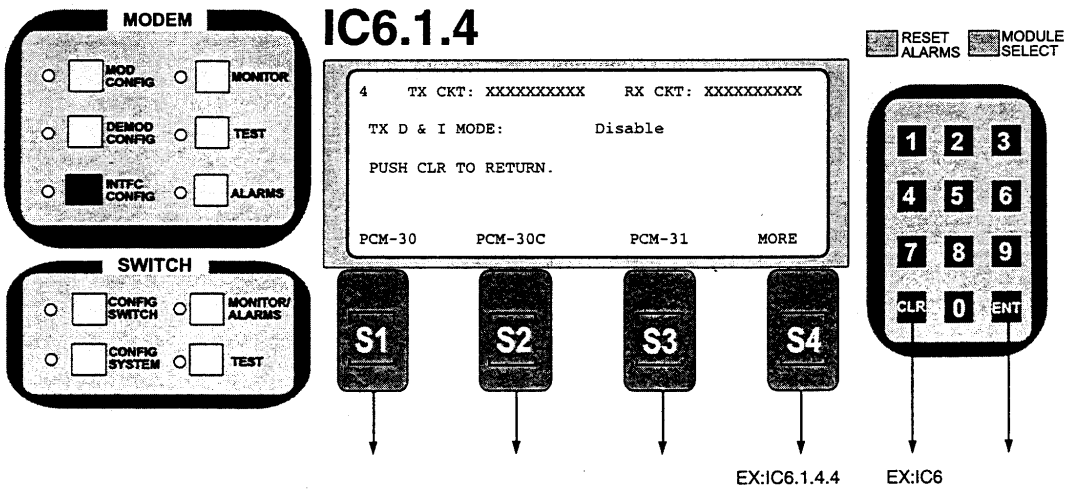


Note: ESC Source: Select Internal or External

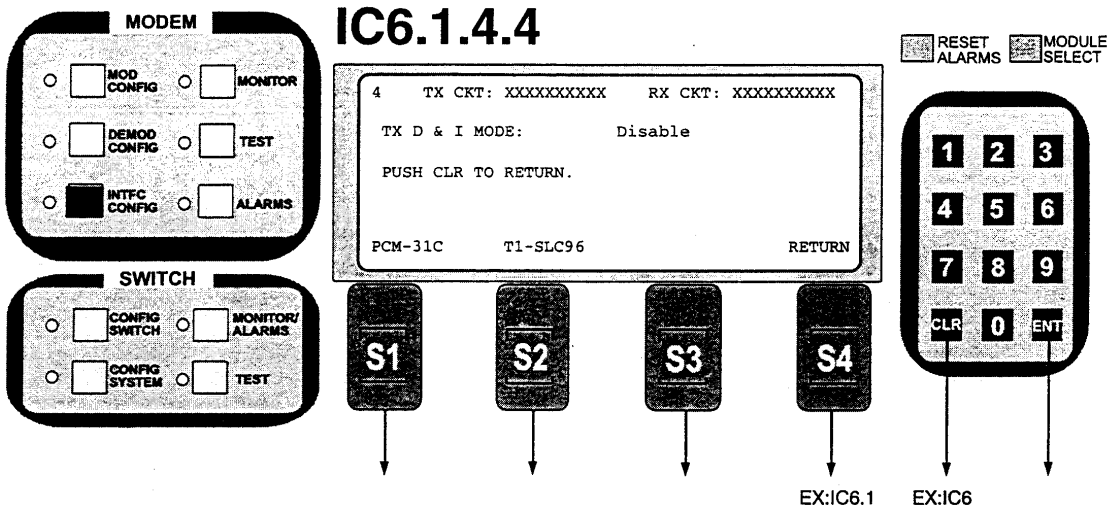




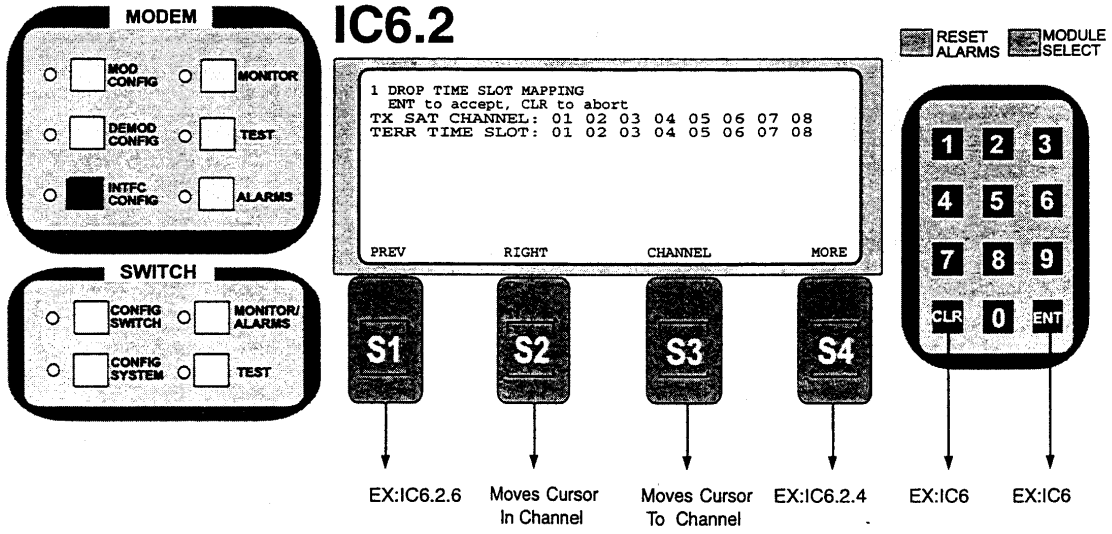
Note: Tx D&I Mode: Select from the following: Disable, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C or T1-SLC96. Additionally, Selection of any D&I mode will prompt: "Due to bandwidth change, the IF output is turned off! Do you want to turn it back on?" Select Yes or No or choose to Return.



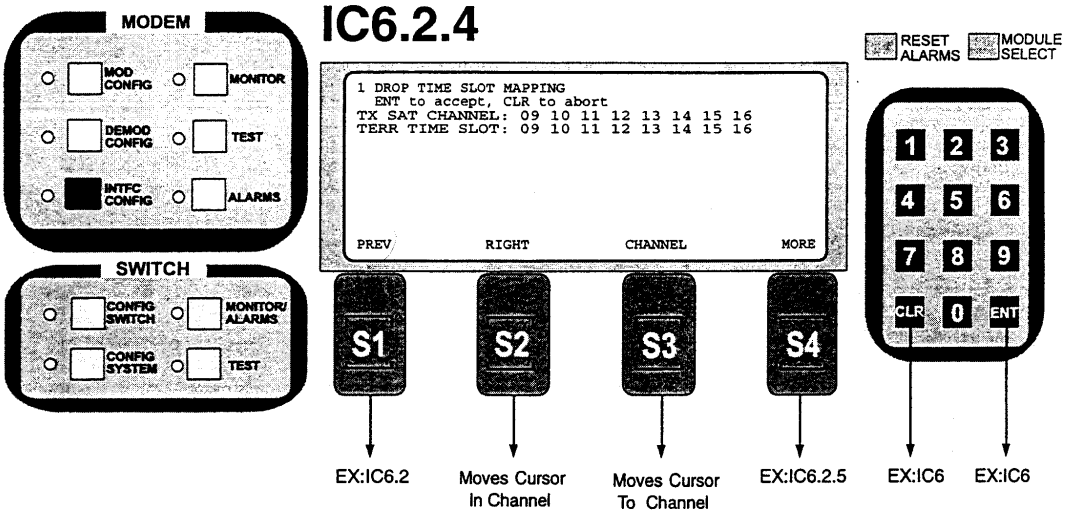
Note: Tx D&I Mode: Select from the following: Disable, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C or T1-SLC96. Additionally, Selection of any D&I mode will prompt: "Due to bandwidth change, the IF output is turned off! Do you want to turn it back on?" Select Yes or No or choose to Return.



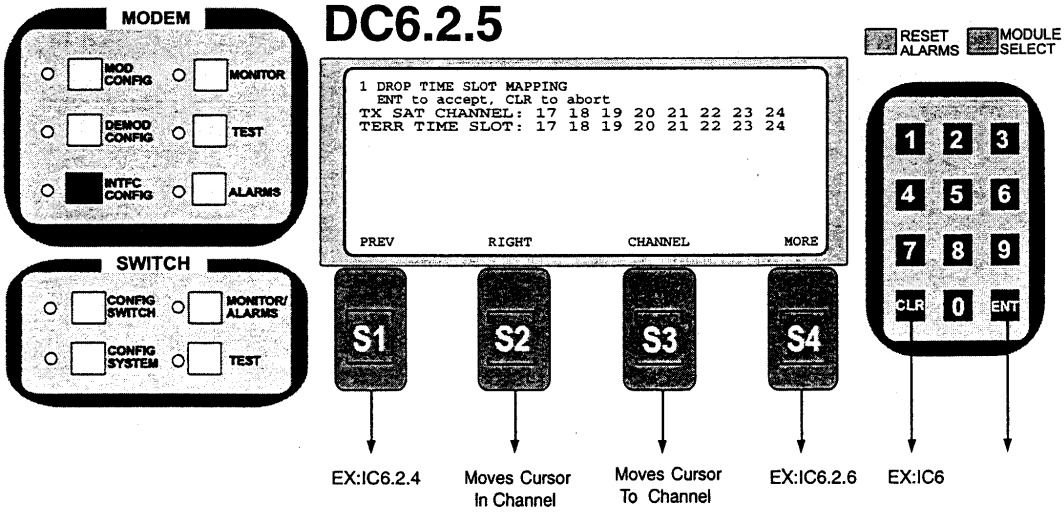
Note: Tx D&I Mode: Select from the following: Disable, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C or T1-SLC96. Additionally, Selection of any D&I mode will prompt: "Due to bandwidth change, the IF output is turned off! Do you want to turn it back on?" Select Yes or No or choose to Return.



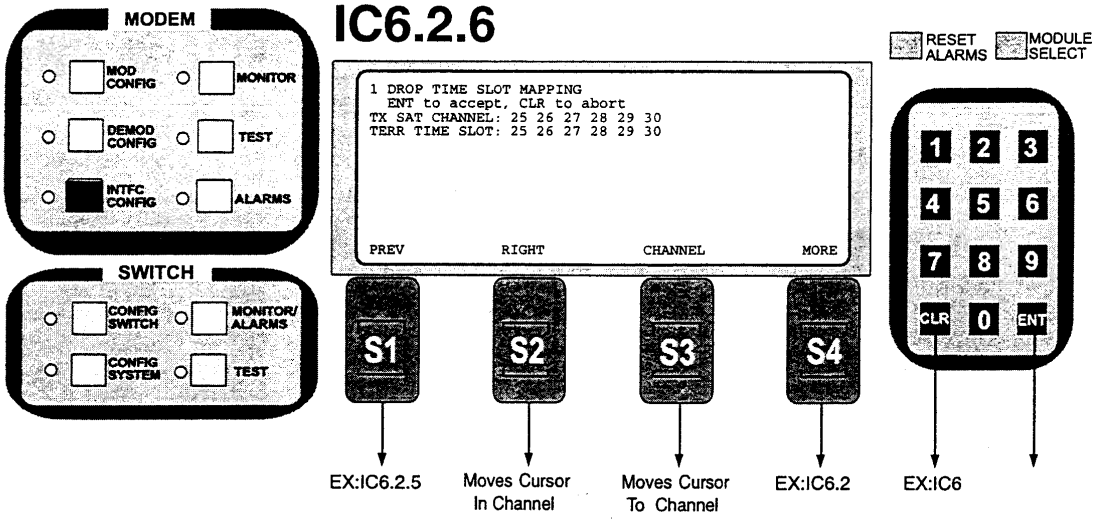
Note: Edit Drop Time Slots: Allows the user to edit the TX EDIT MAP to specify which terrestrial slot will be dropped into which TX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the TX Edit Map, it must be copied to the TX Active Map before it can be implemented.



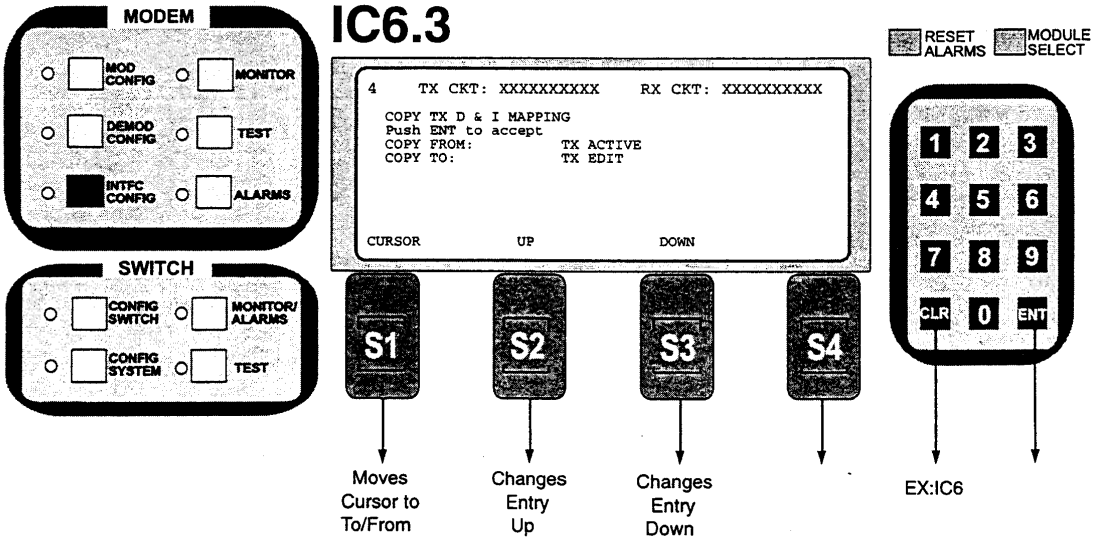
Note: Edit Drop Time Slots: Allows the user to edit the TX EDIT MAP to specify which terrestrial slot will be dropped into which TX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the TX Edit Map, it must be copied to the TX Active Map before it can be implemented.



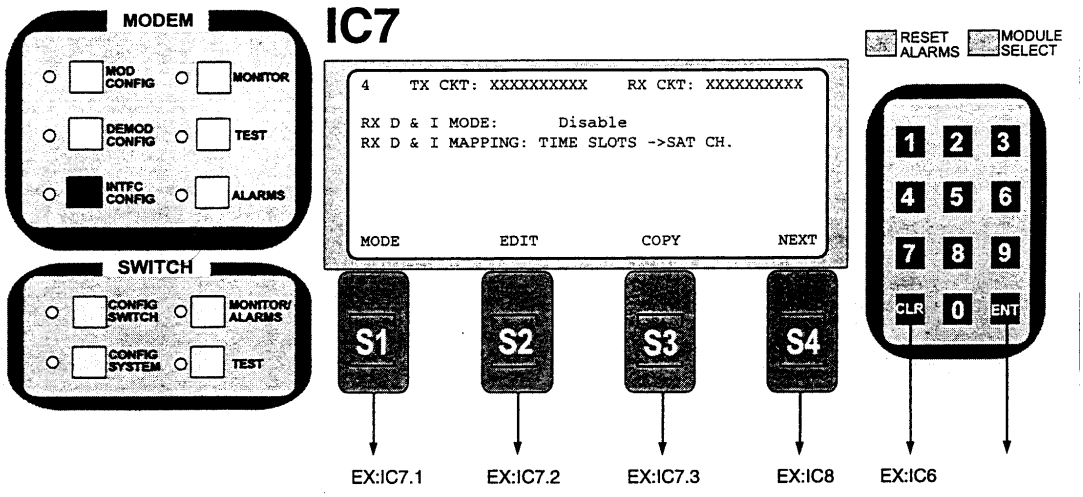
Note: Edit Drop Time Slots: Allows the user to edit the TX EDIT MAP to specify which terrestrial slot will be dropped into which TX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the TX Edit Map, it must be copied to the TX Active Map before it can be implemented.



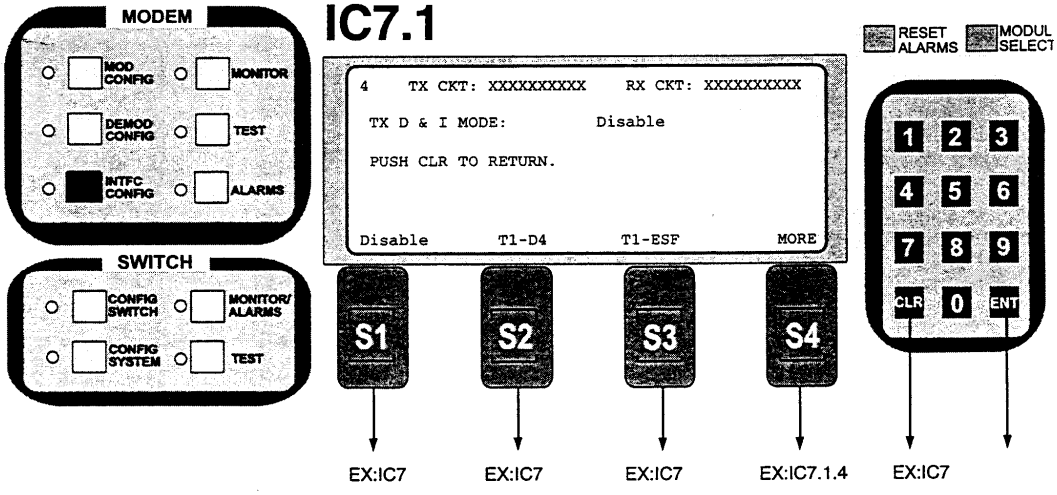
Note: Edit Drop Time Slots: Allows the user to edit the TX EDIT MAP to specify which terrestrial slot will be dropped into which TX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the TX Edit Map, it must be copied to the TX Active Map before it can be implemented.



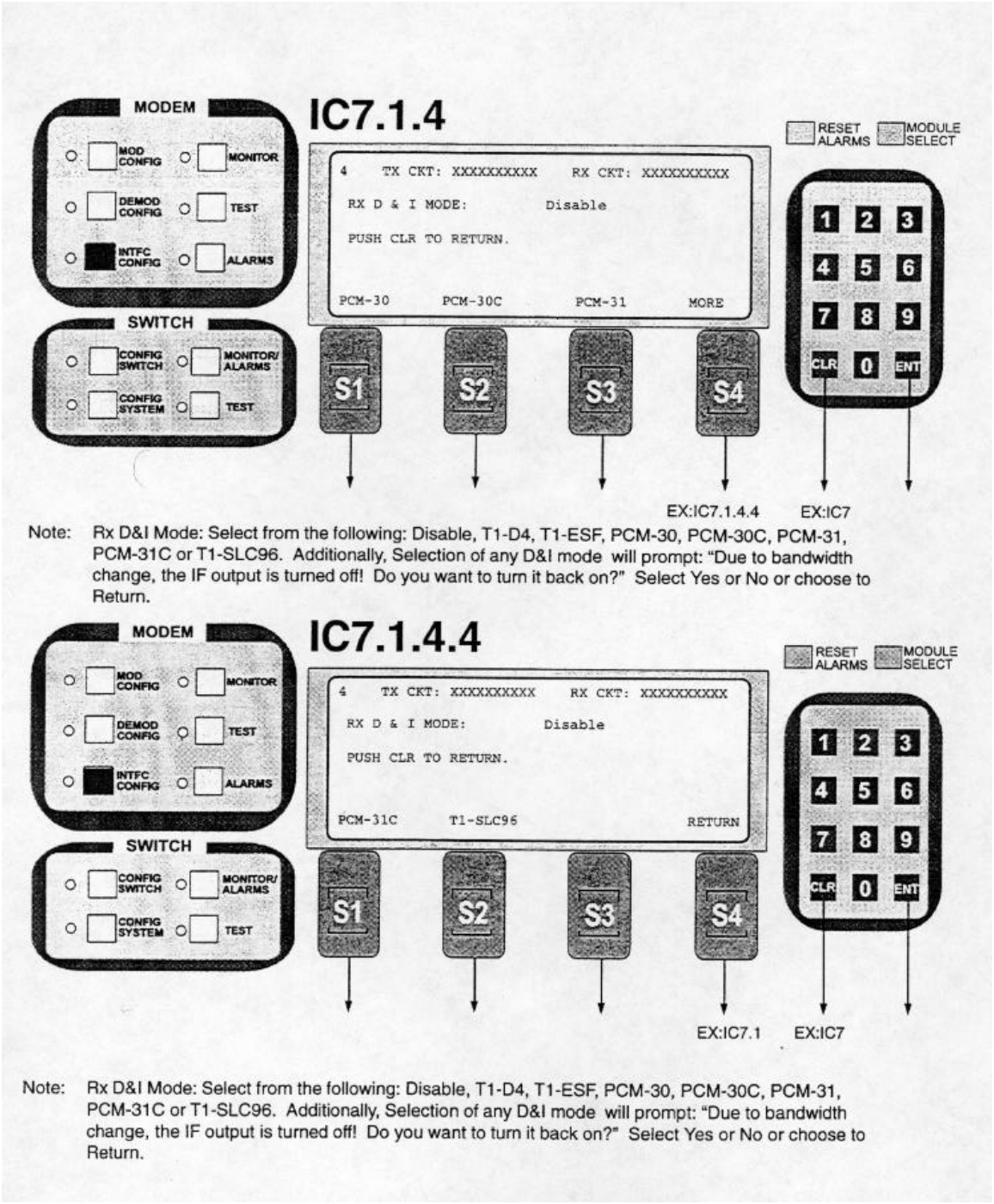
Note: TX D&I Map Copy: Allows the user to copy Drop Time Slot Map. The TX Active Map is the map currently being used by the DMD10 Modems. Available maps are: TX Edit, RX Edit, TX Active, RX Active, ROM 1...8, and User 1...8.



Note: Rx D&I Mode: Select from the following: Disable, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C or T1-SLC96. Additionally, Selection of any D&I mode will prompt: "Due to bandwidth change, the IF output is turned off! Do you want to turn it back on?" Select Yes or No or choose to Return.

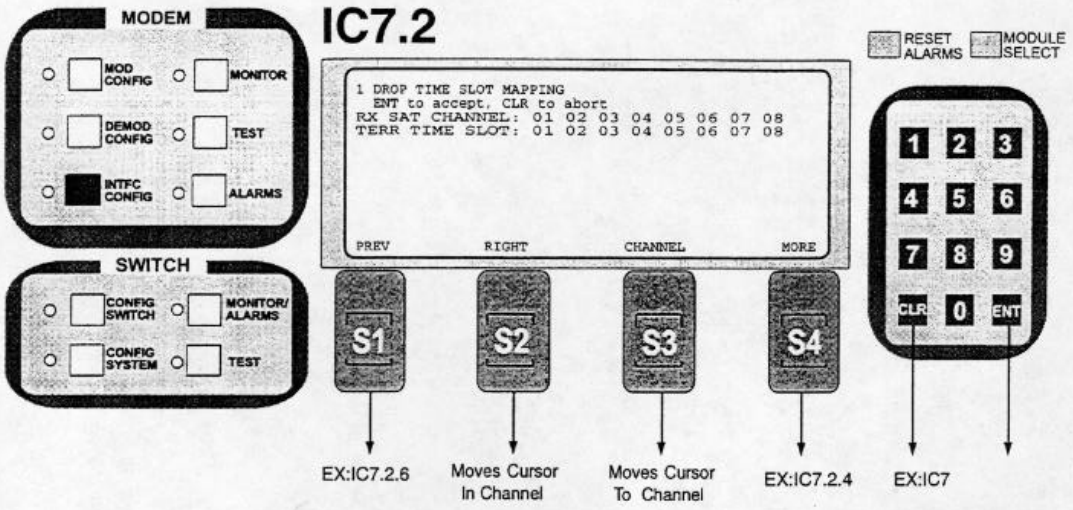


Note: Rx D&I Mode: Select from the following: Disable, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C or T1-SLC96. Additionally, Selection of any D&I mode will prompt: "Due to bandwidth change, the IF output is turned off! Do you want to turn it back on?" Select Yes or No or choose to Return.

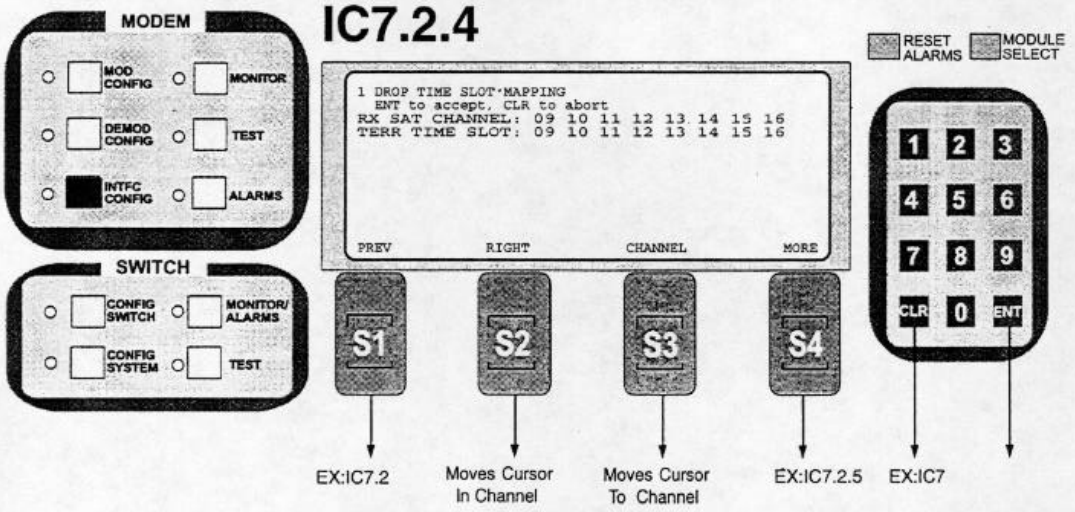


Note: Rx D&I Mode: Select from the following: Disable, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C or T1-SLC96. Additionally, Selection of any D&I mode will prompt: "Due to bandwidth change, the IF output is turned off! Do you want to turn it back on?" Select Yes or No or choose to Return.

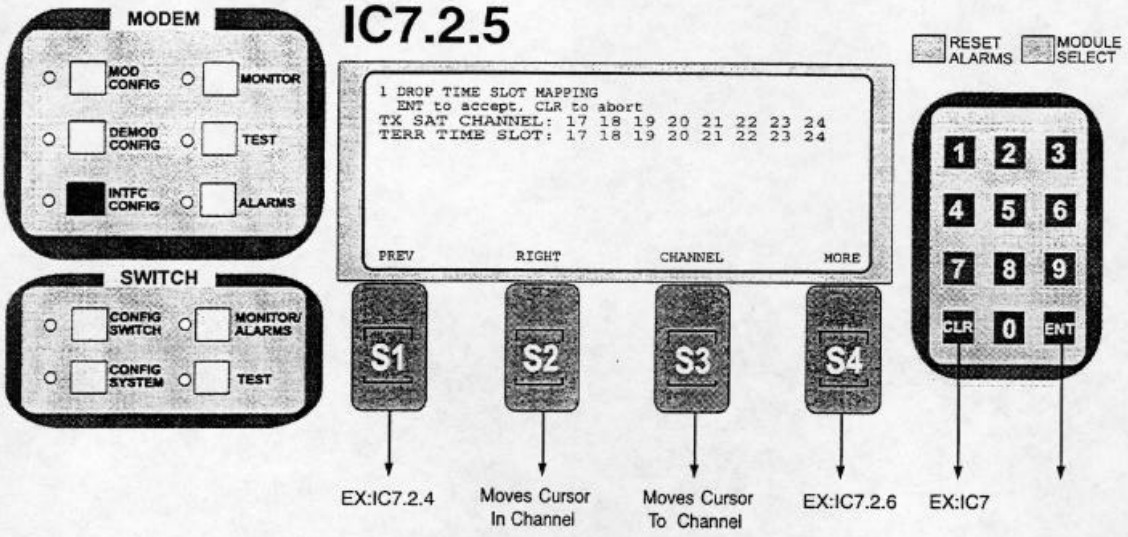
Note: Rx D&I Mode: Select from the following: Disable, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C or T1-SLC96. Additionally, Selection of any D&I mode will prompt: "Due to bandwidth change, the IF output is turned off! Do you want to turn it back on?" Select Yes or No or choose to Return.



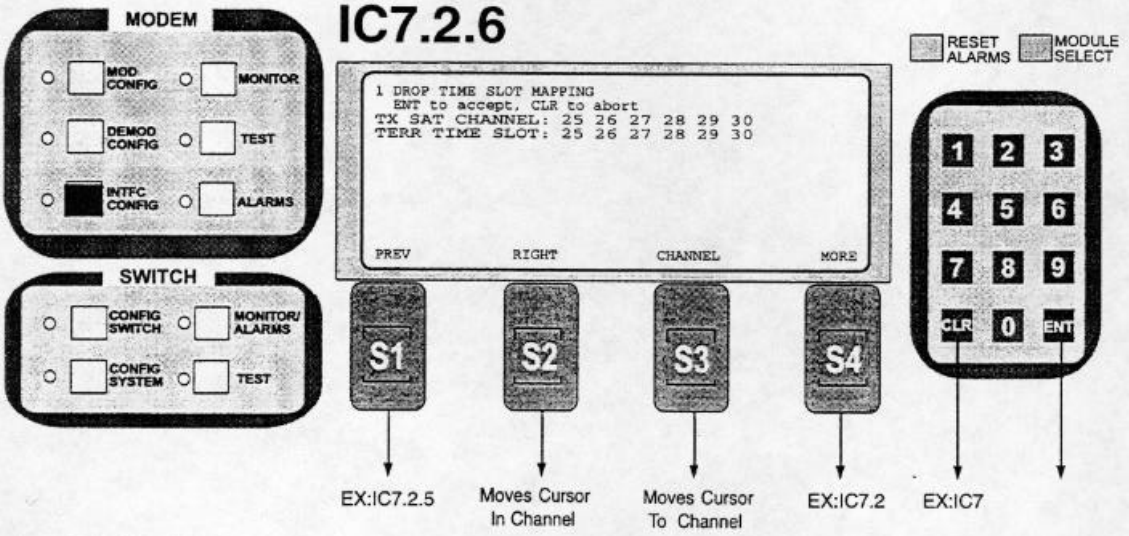
Note: Edit Drop Time Slots: Allows the user to edit the RX EDIT MAP to specify which terrestrial slot will be dropped into which RX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the RX Edit Map, it must be copied to the RX Active Map before it can be implemented.



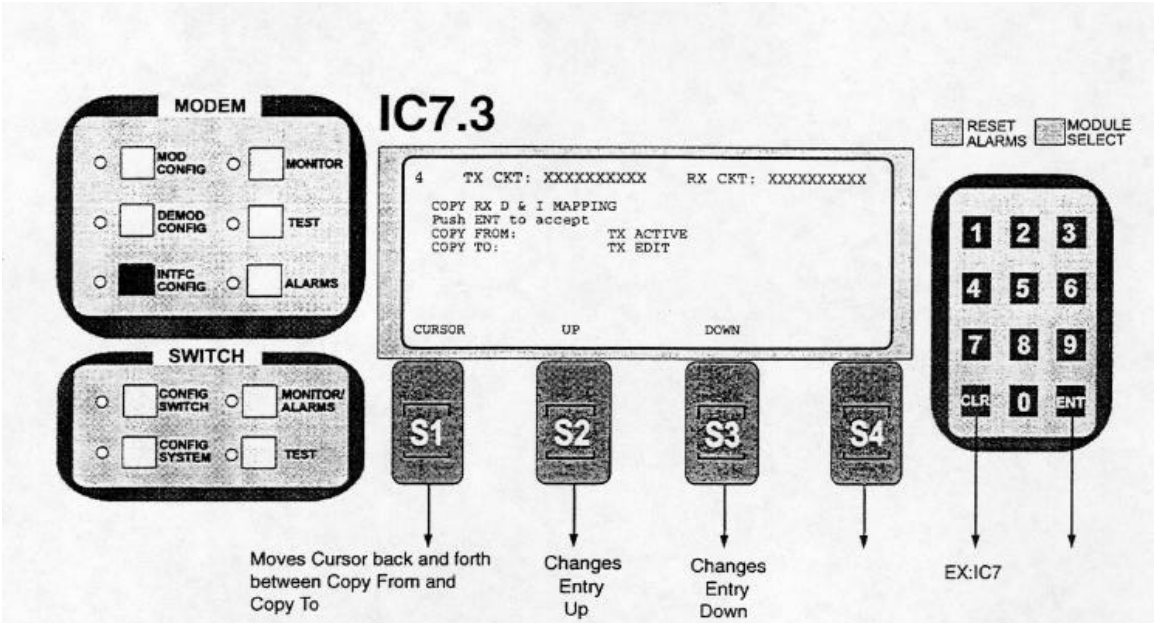
Note: Edit Drop Time Slots: Allows the user to edit the RX EDIT MAP to specify which terrestrial slot will be dropped into which RX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the RX Edit Map, it must be copied to the RX Active Map before it can be implemented.



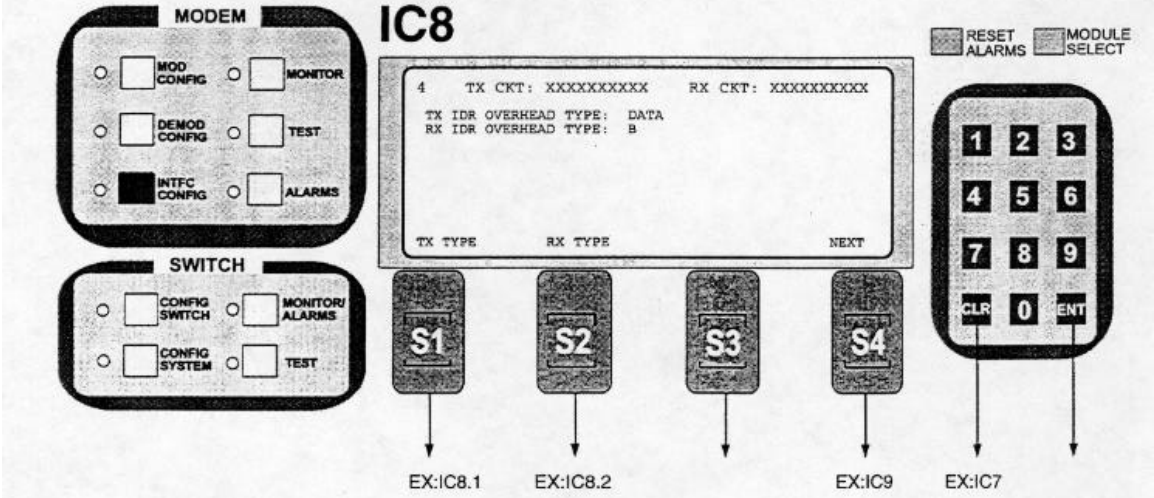
Note: Edit Drop Time Slots: Allows the user to edit the RX EDIT MAP to specify which terrestrial slot will be dropped into which RX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the RX Edit Map, it must be copied to the RX Active Map before it can be implemented.

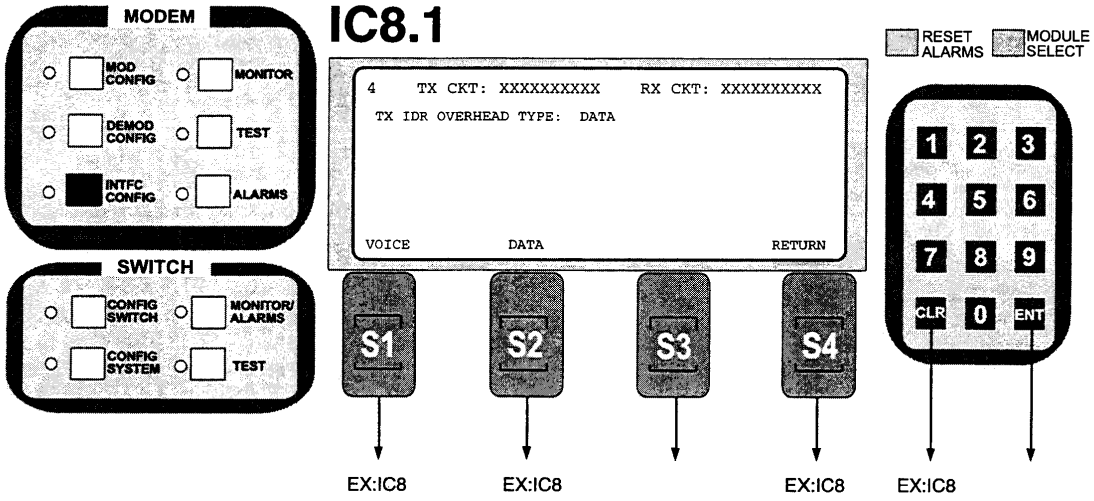


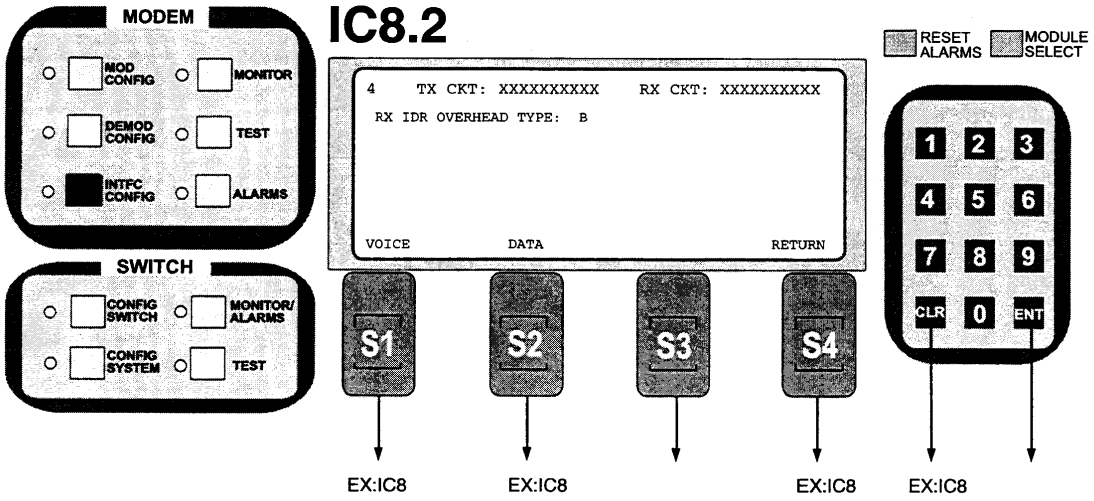
Note: Edit Drop Time Slots: Allows the user to edit the RX EDIT MAP to specify which terrestrial slot will be dropped into which RX SAT Channel. The Satellite Channels are fixed and the number is determined by the data rate. The number of terrestrial slots available is determined by the Drop Mode. When the user has completed the edit of the RX Edit Map, it must be copied to the RX Active Map before it can be implemented.

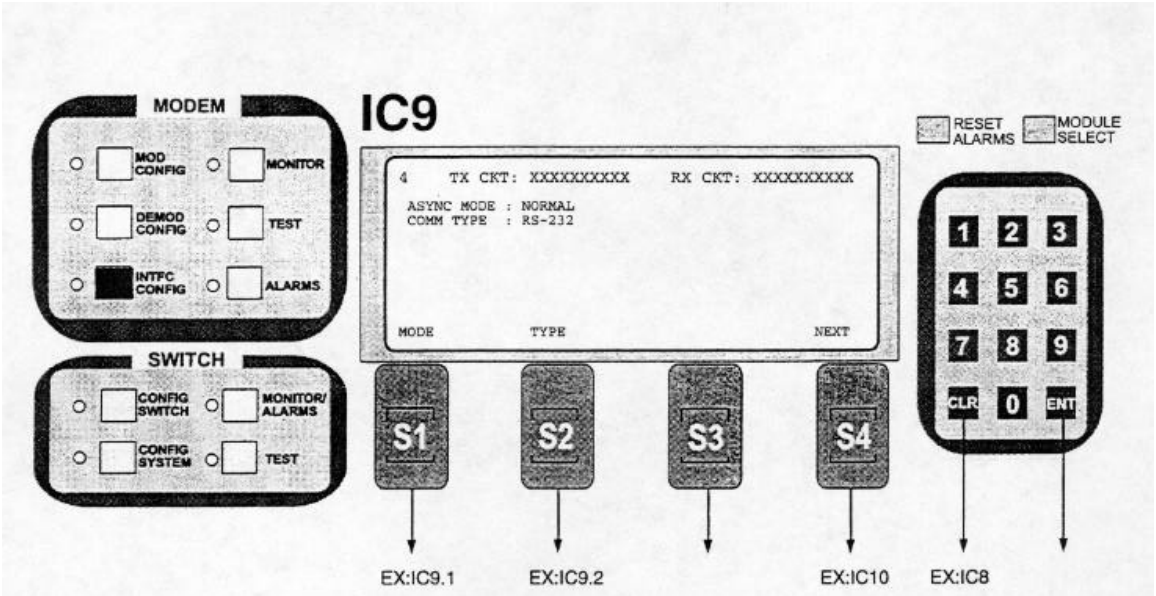


Note: Alows user to copy Drop and Insert Maps. Available selections include: Rx Edit, Tx Edit, Rx Active, Tx Active, ROM 8...ROM 1, User 8...User 1.

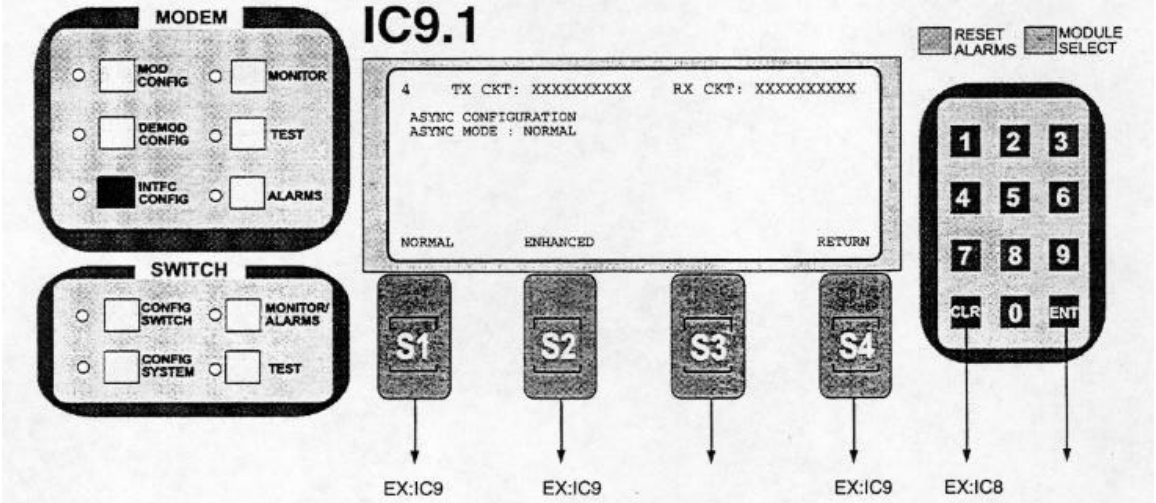



IC8.1
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
TX IDR OVERHEAD TYPE: DATA
VOICE
DATA
RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC8
EX:IC8
EX:IC8
EX:IC8

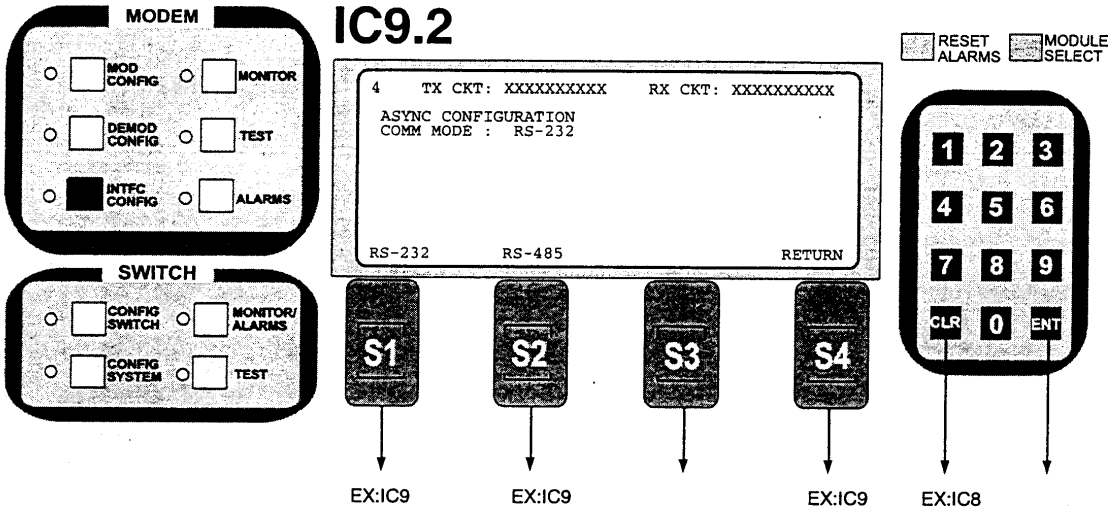

IC8.2
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
4 TX CKT: XXXXXXXXXX RX CKT: XXXXXXXXXX
RX IDR OVERHEAD TYPE: B
VOICE
DATA
RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:IC8
EX:IC8
EX:IC8
EX:IC8



Note: Select ASYNC Mode and Type.



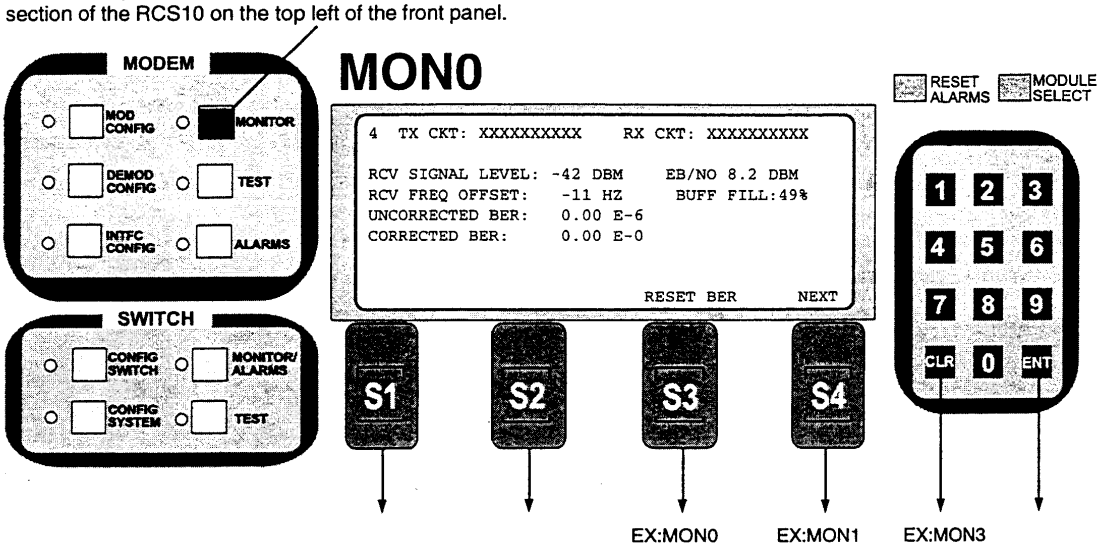
Note: Select ASYNC Mode Configuration: Normal or Enhanced.



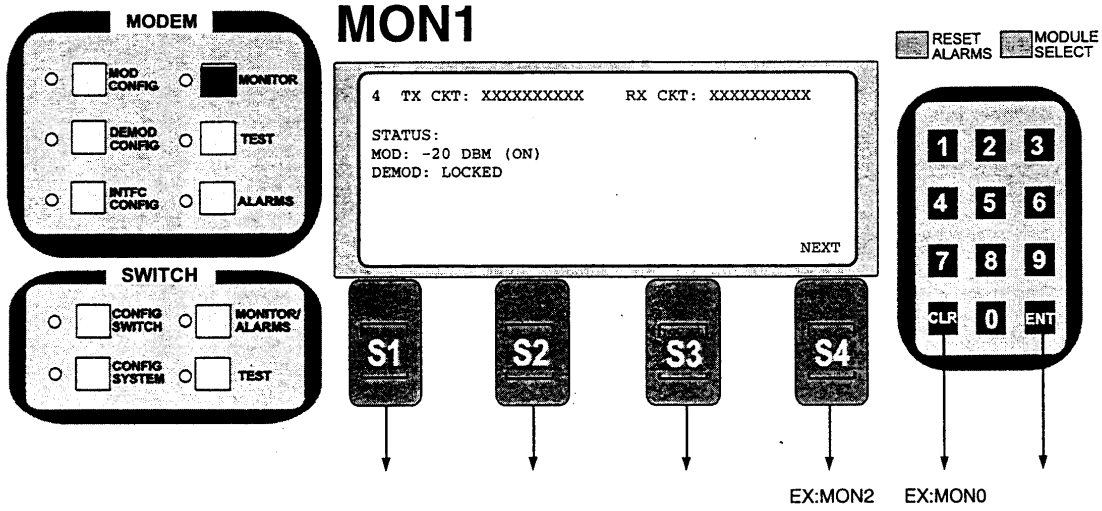
Note: ASYNC COMM Mode Configuration: Select RS-232 or RS-485.

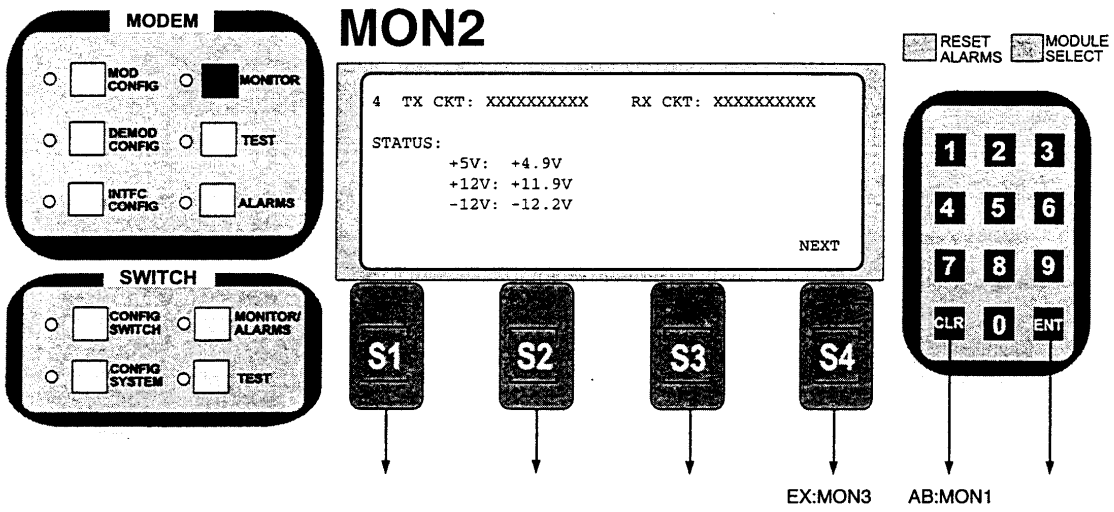
3.12 RCS10 Modem Monitor Configuration Front Panel Menu Screens

The following screens are accessed by depressing the MONITOR button located in the Modem section of the RCS10 on the top left of the front panel.

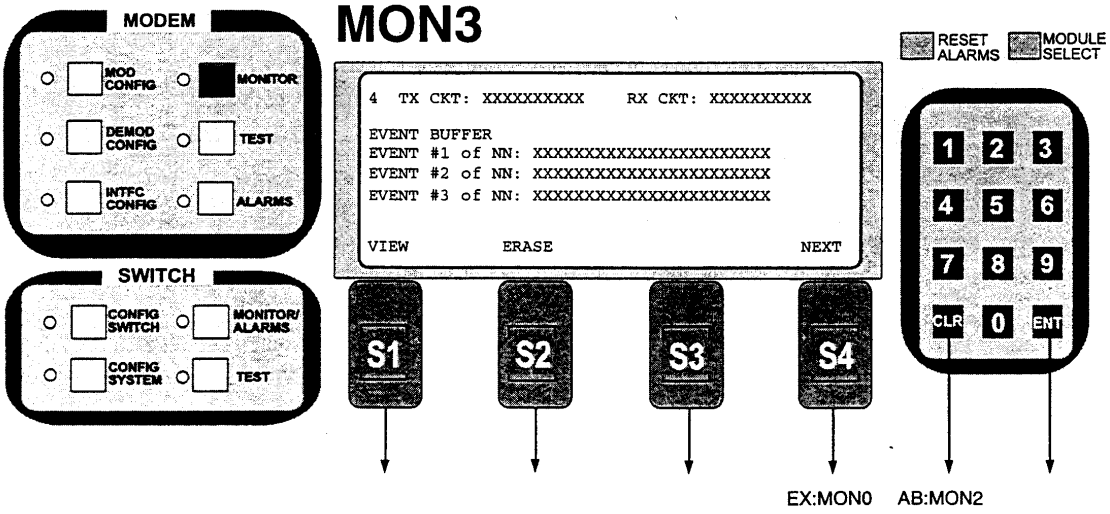


Notes: RCV Signal Level: Estimated receive signal level as seen by the Demodulator.
Eb/No: Estimated Eb/No as seen by the Demodulator.
RCV Freq. Offset: The received carrier frequency offset as measured by the Modem.
Buffer Fill: Percentage of buffer that has been filled.
Uncorrected BER: Estimated corrected bit error rate before decoding.
Corrected BER: Estimated corrected bit error rate after decoding.

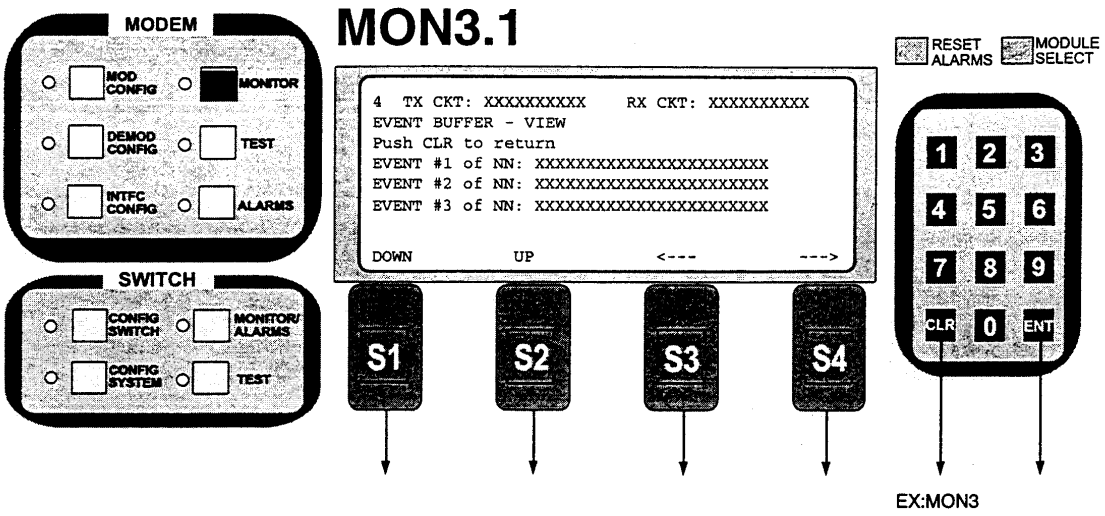




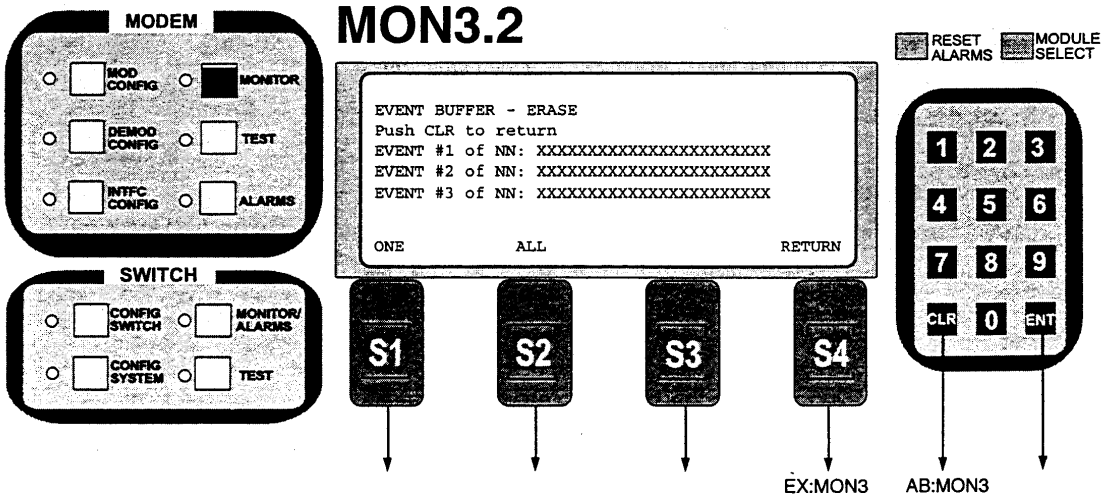
Notes: Reports status of the +5, +12 and -12 Volt power busses inside the modem.



Notes: Reports the Stored Events in the event buffer.



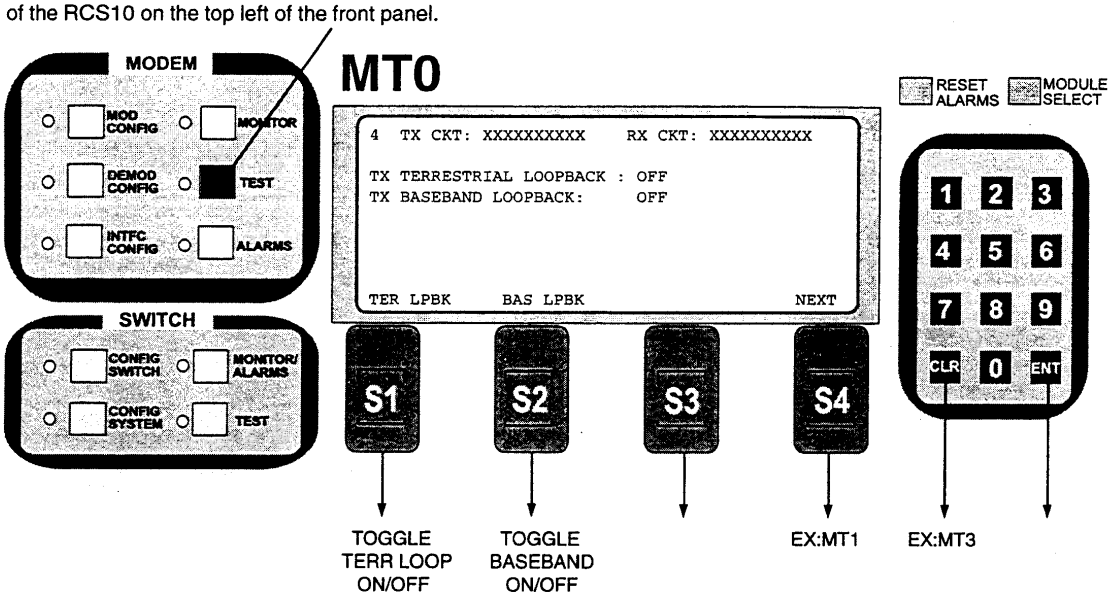
Notes: Displays modem events stored in the Event Buffer. Depress DOWN to scroll down and UP to scroll up. Use arrows to scroll left and right.



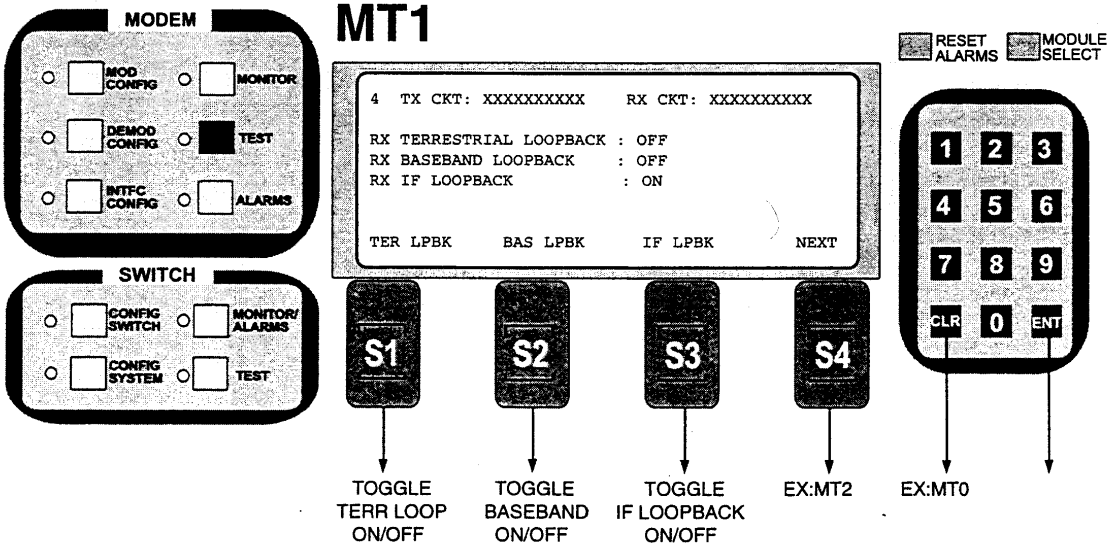
Notes: Depress ONE to erase the top event as displayed, or ALL to erase all events.

3.13 RCS10 Modem Test Configuration Front Panel Menu Screens

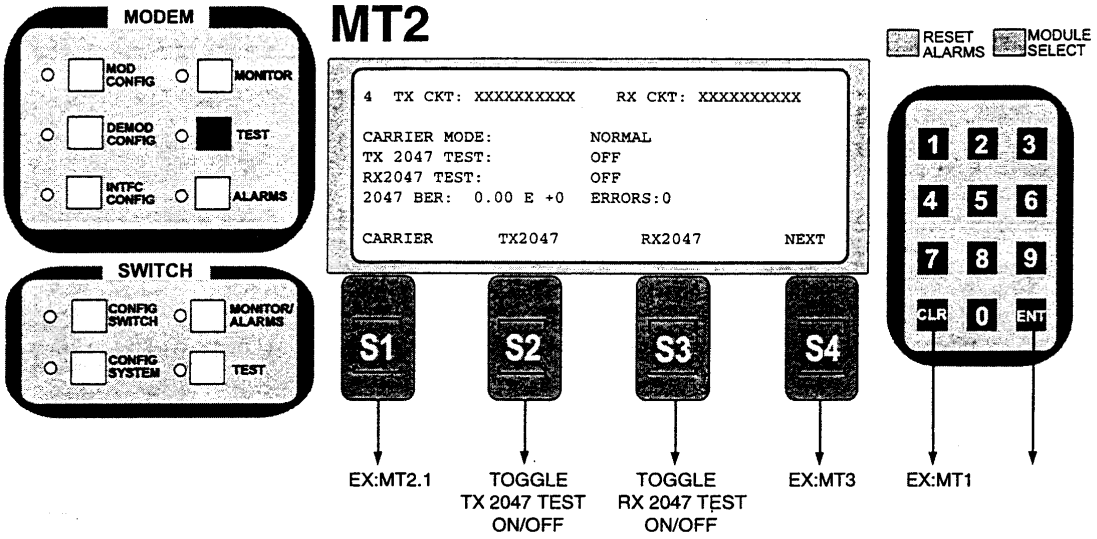
The following screens are accessed by depressing the TEST button located in the Modem section of the RCS10 on the top left of the front panel.



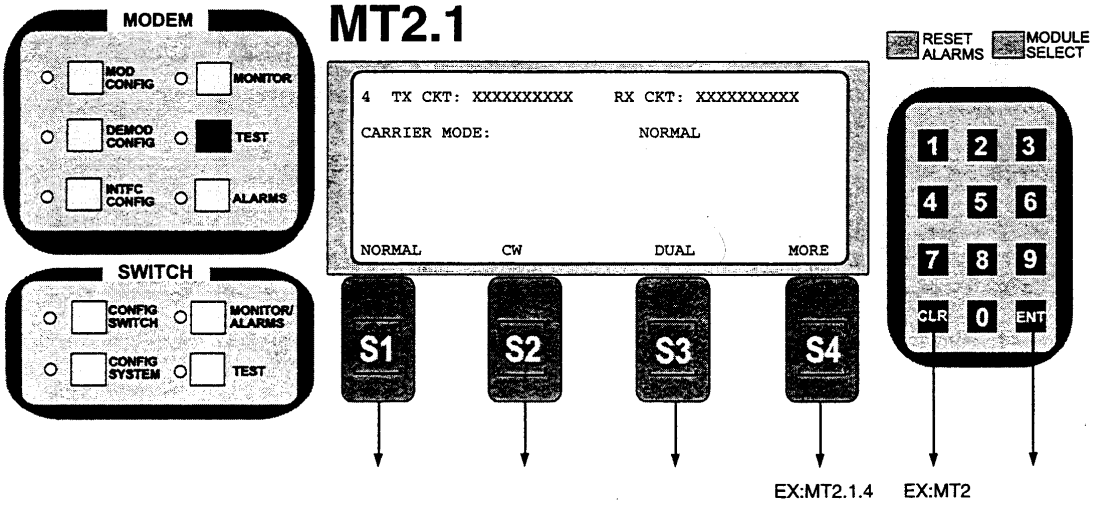
Notes: TX Terrestrial Loopback: Sends TX Terrestrial Data to RX Data Out.
TX Baseband Loopback: Sends TX Data to the Receive Input.



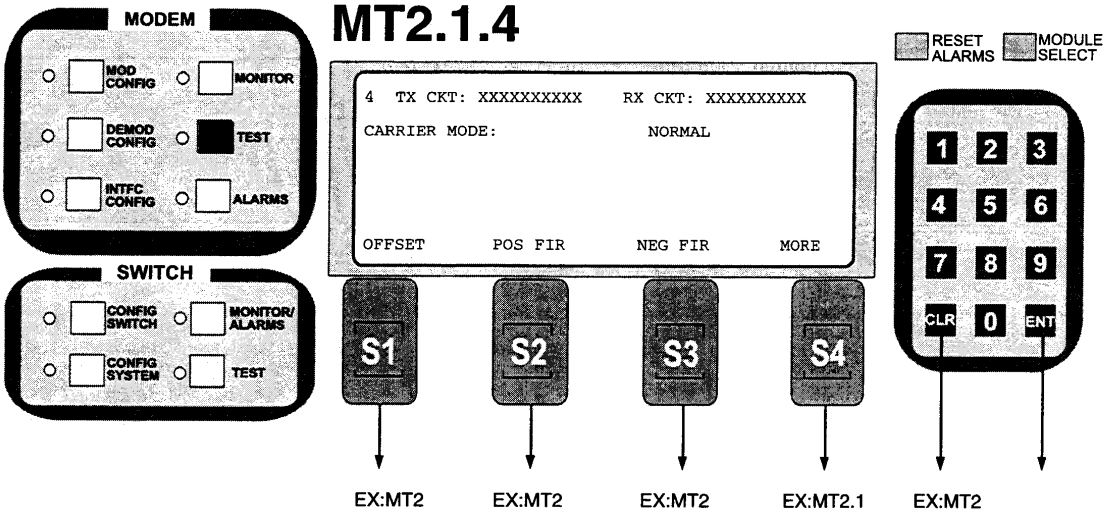
Notes: RX Terrestrial Loopback: Sends received Satellite Data back.
RX Baseband Loopback: Sends RX data from the modem card to the TX Data Input of the Modem card.
RX IF Loopback: Loops the IF output of the Modulator to the IF input of the Demodulator.



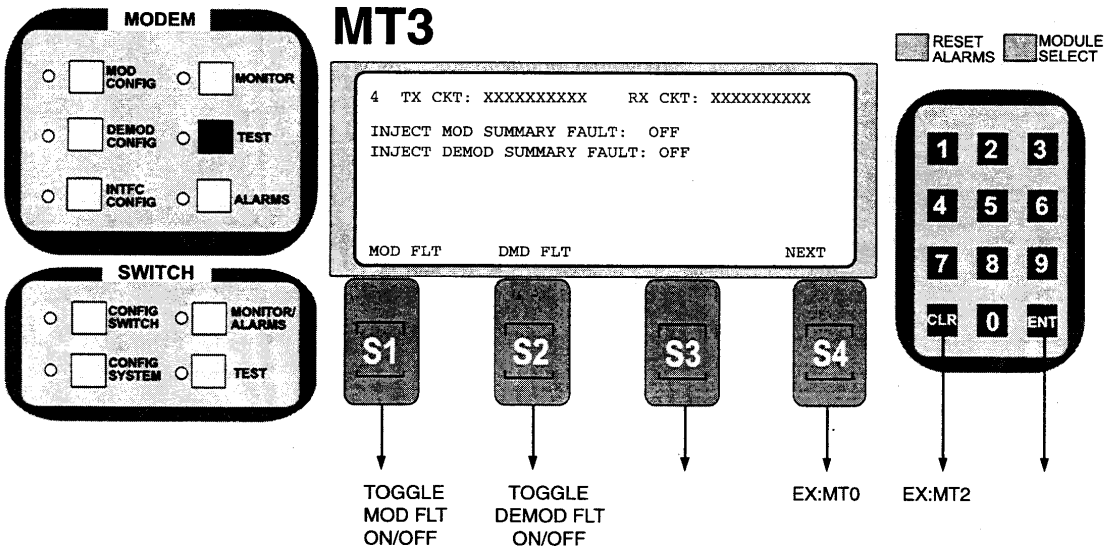
Notes: TX 2047 Test: Enables the TX 2047 Pattern Generator.
RX 2047 Test: Enables the RX2047 Pattern Checker.
2047 BER: Shows the Bit Error Rate of the 2047 Pattern.
Errors: Shows the number of errors detected by the 2047 Pattern Checker.



Notes: Carrier Mode: Select Mode: Normal: Traffic Mode
CW: Causes the Modulator to output Pure Carrier
Dual: Causes a double sideband output
Offset: Causes a single sideband output
POS FIR: Injects a positive pulse data waveform into the Baseband Channels
NEG FIR: Injects a negative pulse data waveform into the Baseband Channels



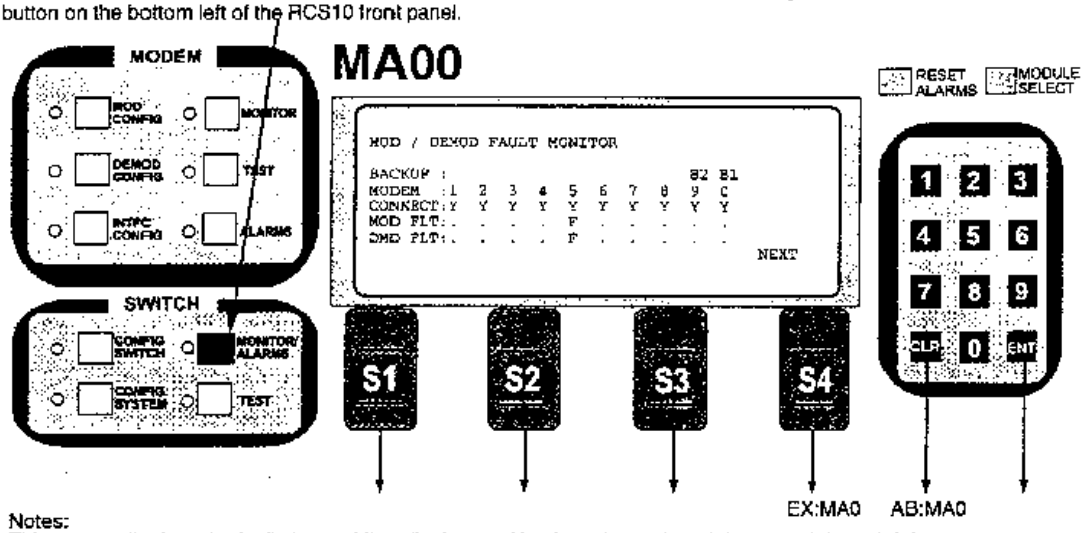
Notes: Carrier Mode: Select Mode: Normal: Traffic Mode
CW: Causes the Modulator to output Pure Carrier
Dual: Causes a double sideband output
Offset: Causes a single sideband output
POS FIR: Injects a positive pulse data waveform into the Baseband Channels
NEG FIR: Injects a negative pulse data waveform into the Baseband Channels



Notes: Inject MOD Summary Fault. Creates a modulator summary fault for testing purposes.
Inject DEMOD Summary Fault. Creates a modulator summary fault for testing purposes.

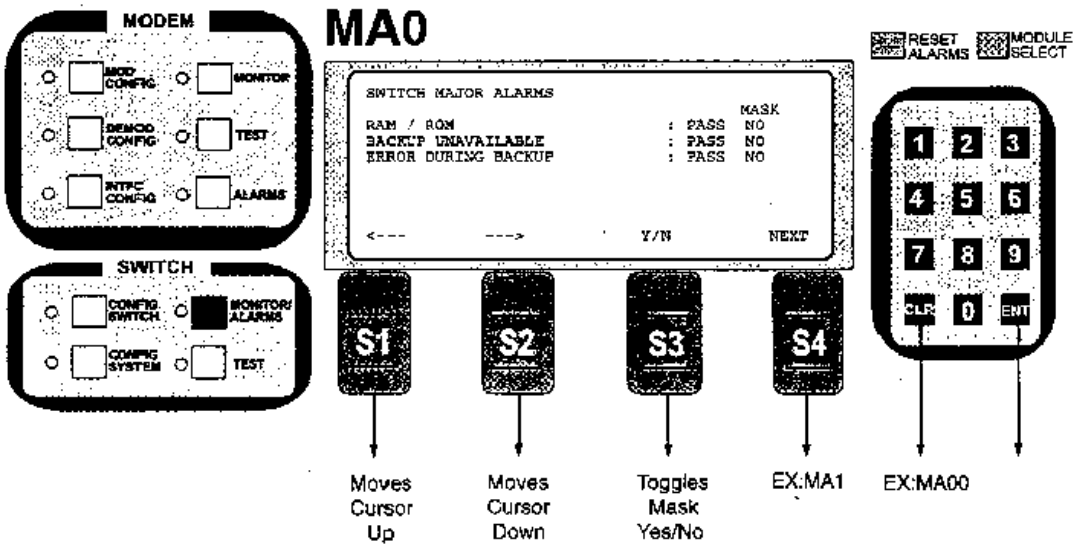
3.17 Switch Monitor/Alarms

The following RCS10 Switch Monitor and Alarms screens are accessible by depressing the MONITOR/ALARMS button on the bottom left of the RCS10 front panel.

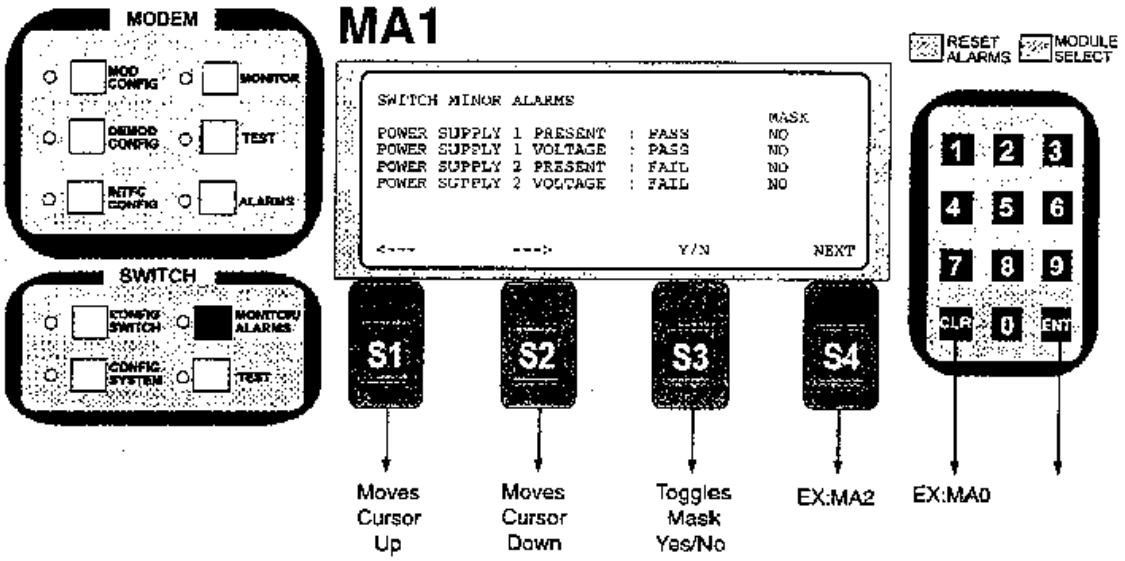


Notes:
This screen displays the fault status of the all prime and backup channel modulators and demodulators.
The screen above uses the following one letter codes:

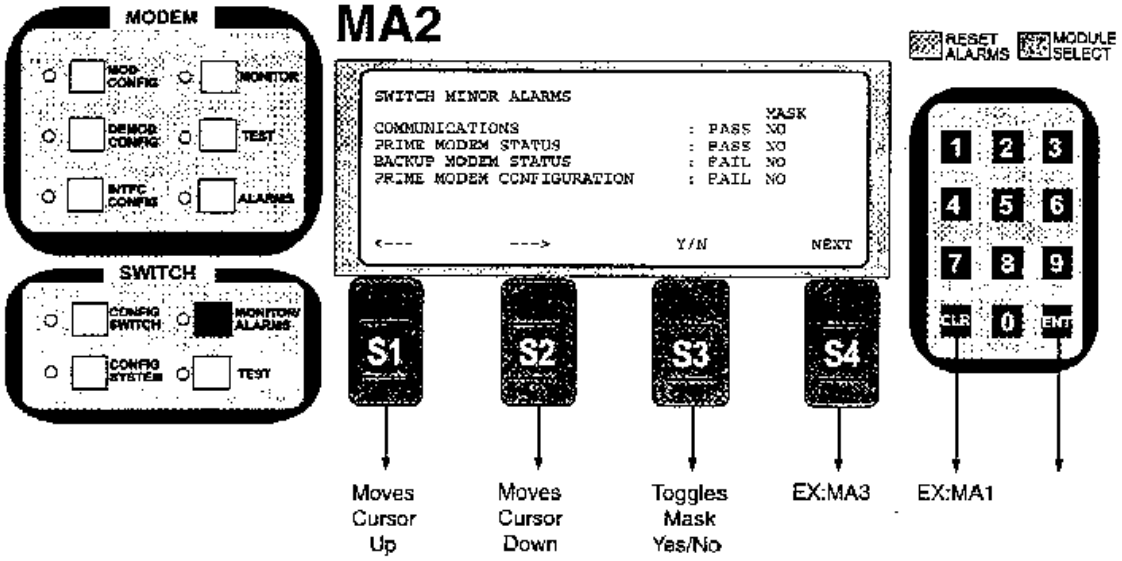
- '.' Indicates that the modulator or demodulator is reporting status normal.
- 'F' Indicates that the modulator of demodulator is reporting failure status. Note that when a channel is configured for linked switching, either a modulator fault or a demodulator fault will report both modulator and demodulator faults to the RCS10.



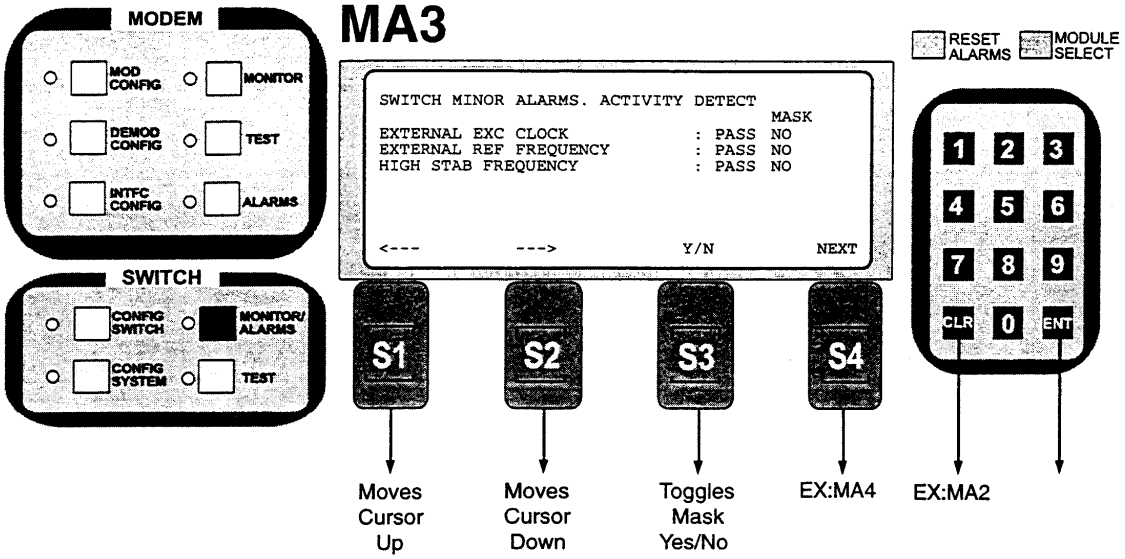
Note: Switch Major Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.



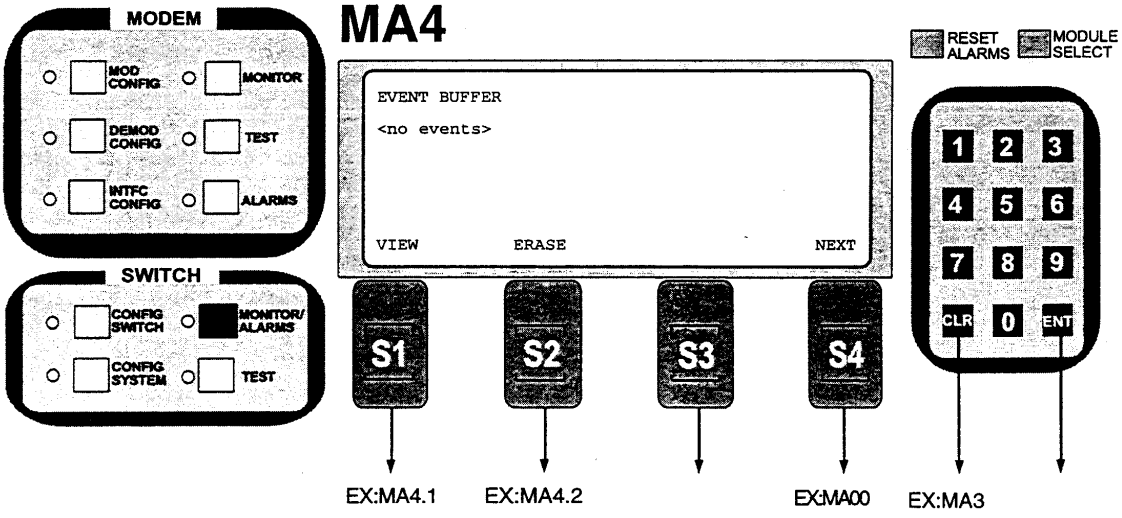
Note: Switch Major Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.

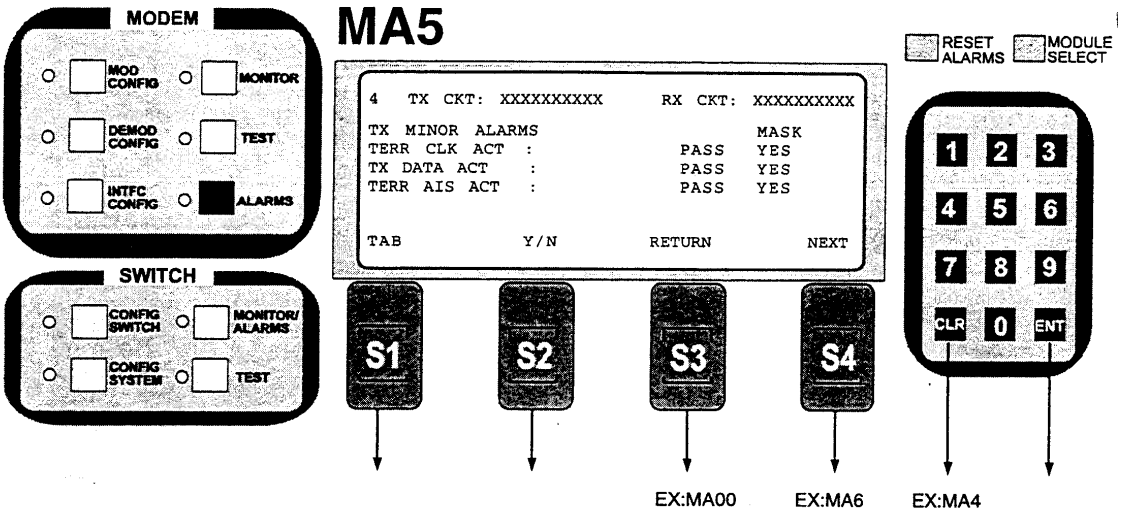


Note: Switch Major Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.

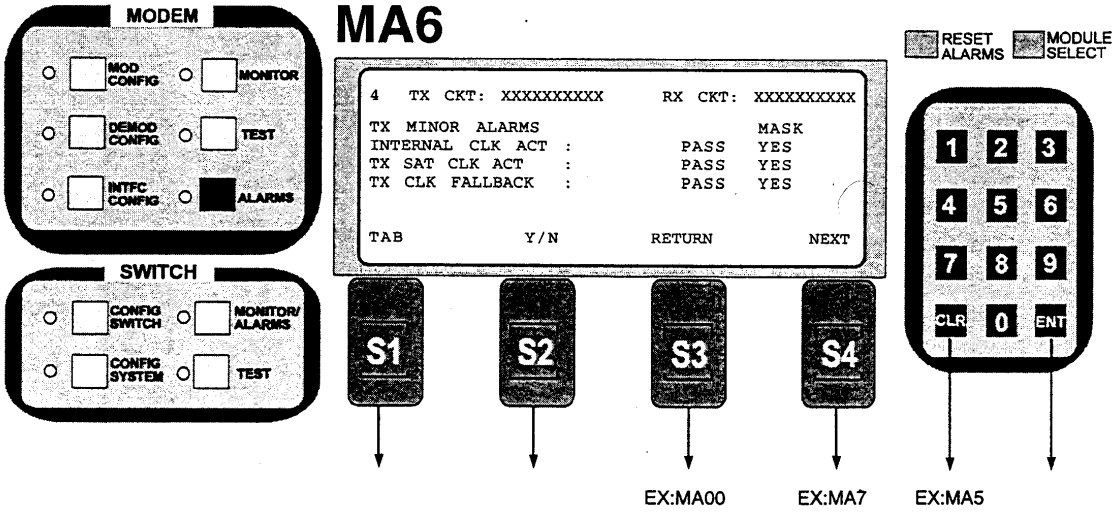


Note: Switch Minor Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.

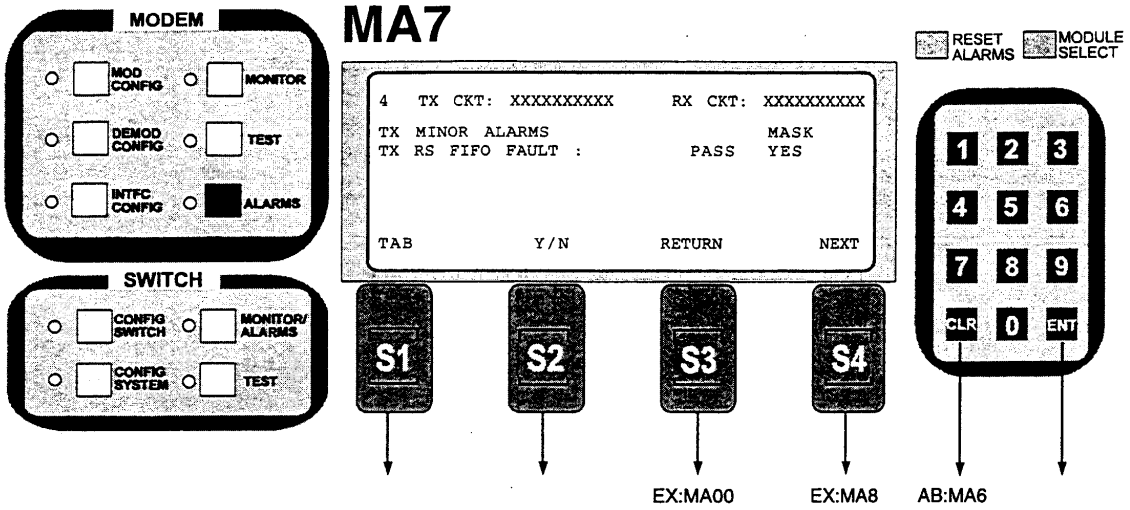




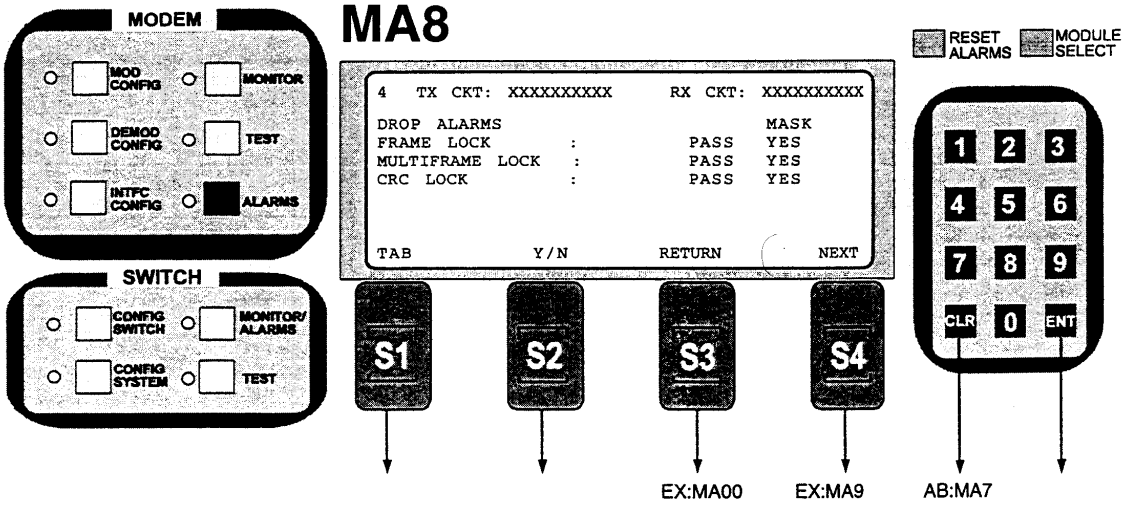
Notes: TERR CLK ACT: Terrestrial clock activity
TX CLK ACT: Transmit Data activity
TERR AIS ACT: Terrestrial Data all 1's Activity



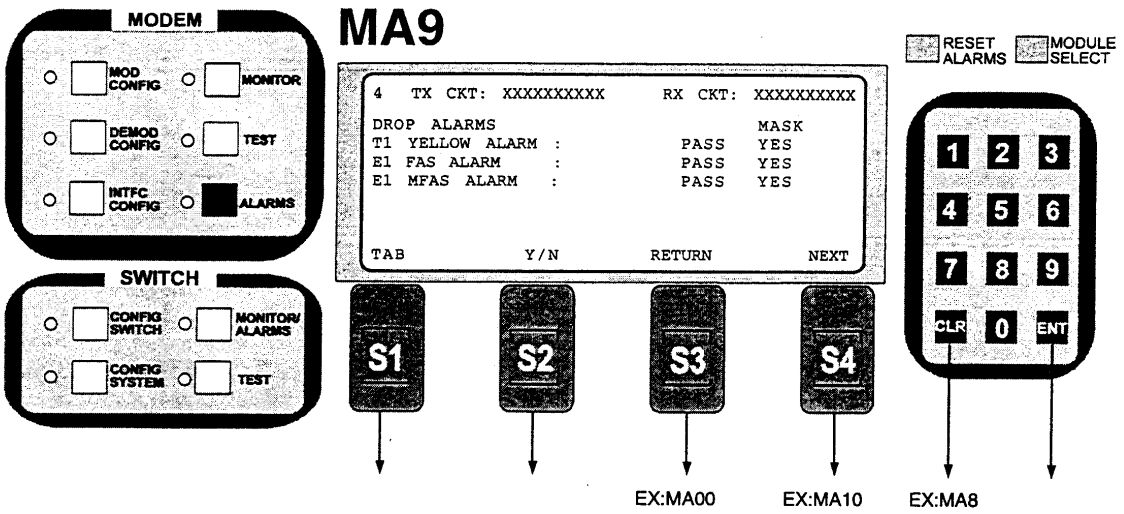
Notes: INTERNAL CLK ACT: Indicates SCT activity
TX SAT CLK ACT: Indicates TX SAT CLK activity.
TX CLK FALLBACK: Indicates if a Transmit Clock Fallback has occurred.



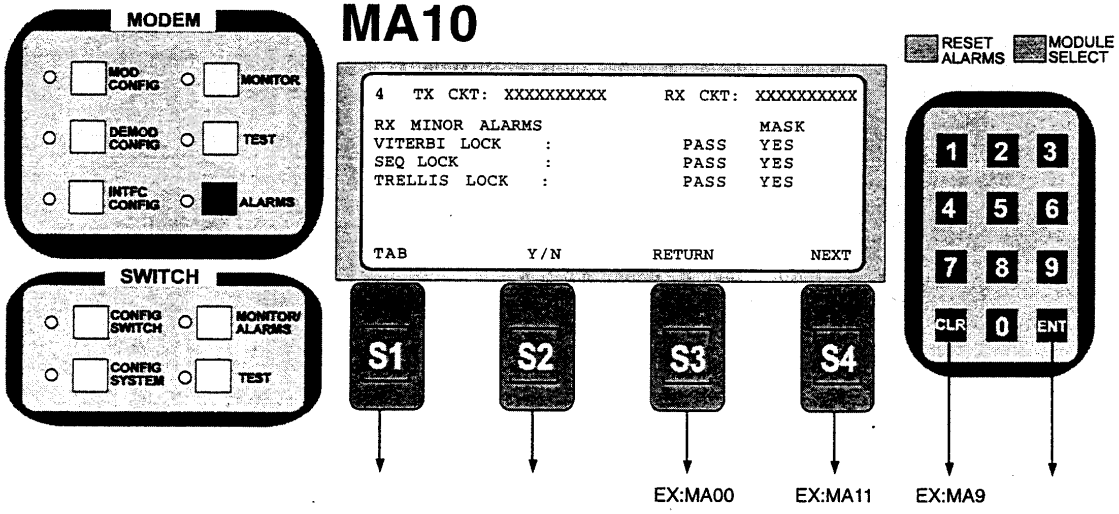
Notes: TX RS FIFO FAULT: Transmit Reed-Solomon FIFO Fault.



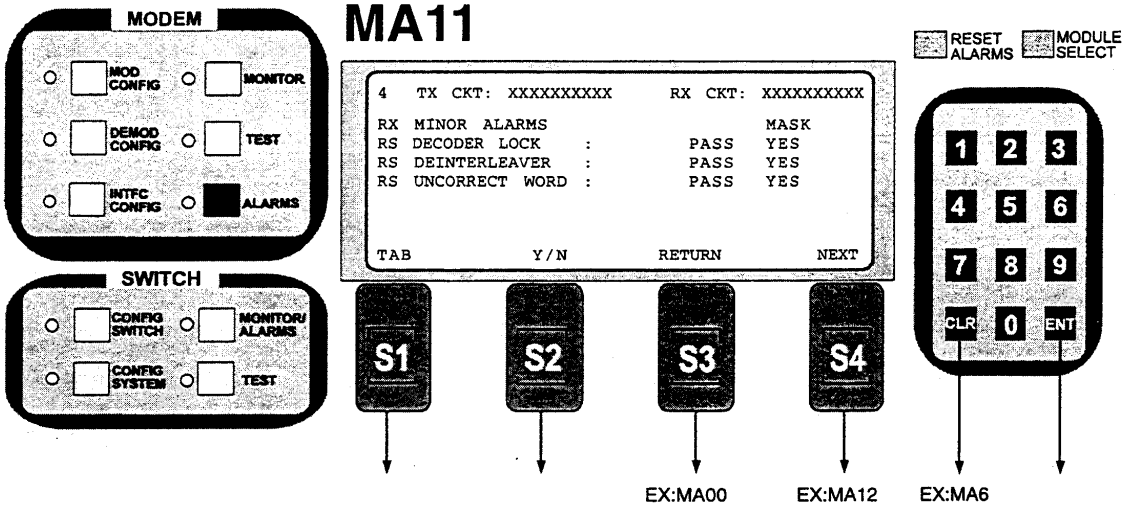
Notes: FRAME LOCK: Drop Frame Sync Lock Fault.
MULTIFRAME LOCK: Drop multi-frame sync lock fault. Valid in PCM30 and PCM30C.
CRC LOCK: Drop CRC Lock Fault. Valid only in T1_ESF, PCM30C and PCM31C.



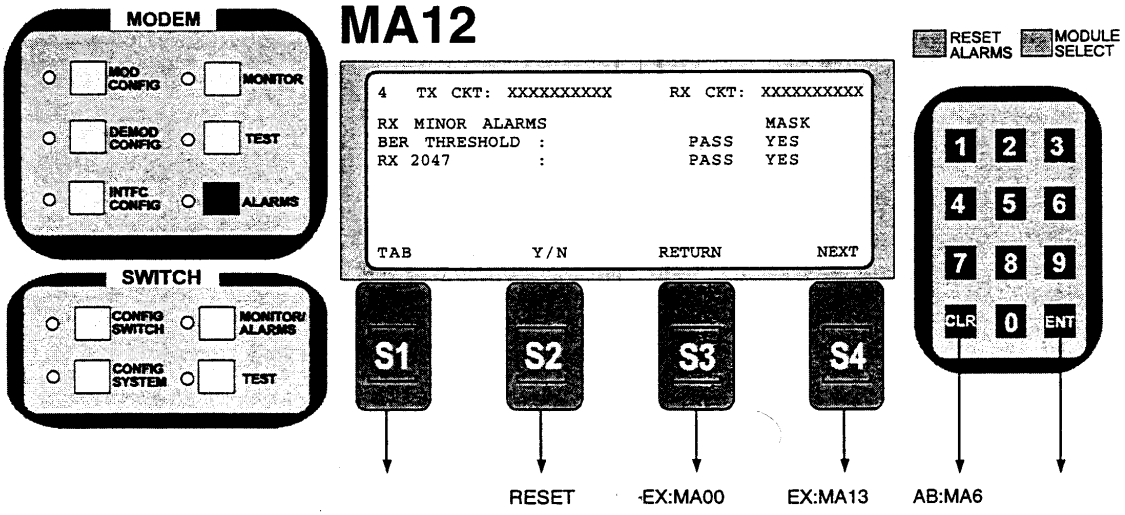
Notes: T1 YELLOW ALARM: Drop T1 Tellow Alarm Fault. Valid only in T1_ESF, T1D4 and SLC96.
E1 FAS ALARM: Drop E1 FAS Alarm. Valid only in PCM30, PCM30C, PCM31 and PCM31C.
E1 MFAS ALARM: Drop E1 MFAS Alarm. Valid only in PCM30, PCM30C, PCM31 and PCM31C.



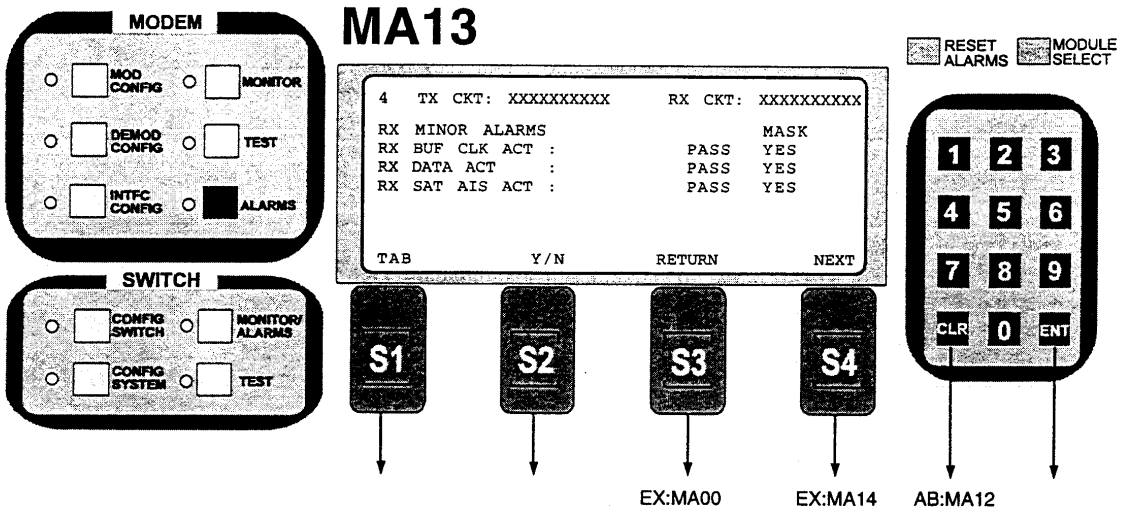
Notes: VITERBI LOCK: Indicates the Viterbi Decoder is in a lock condition
SEQ LOCK: Indicates the Sequential Decoder is in a lock condition
TRELLIS LOCK: Indicates the Trellis Decoder is in a lock condition



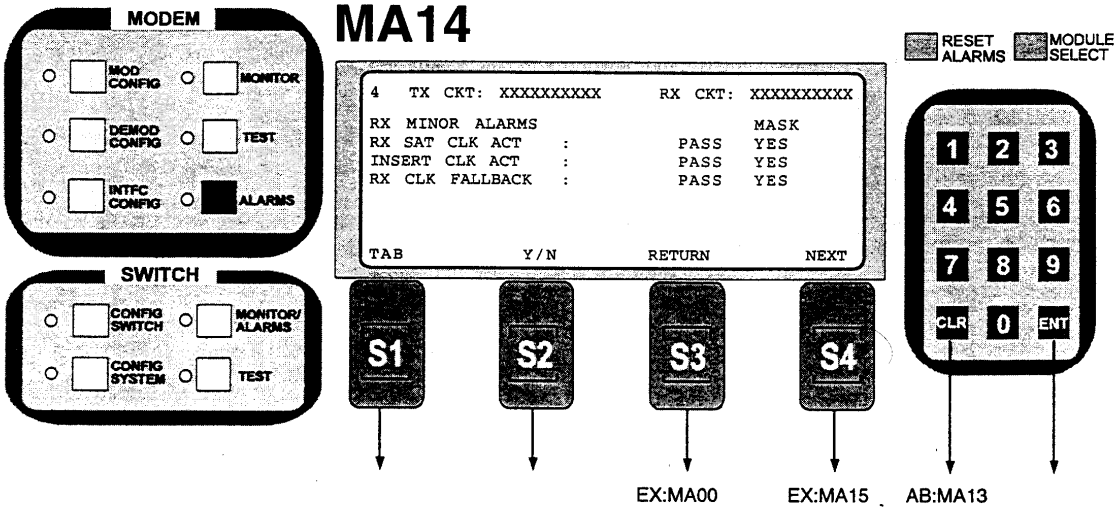
Notes: RS DECODER LOCK: Reed-Solomon Decoder lock fault.
RS DEINTERLEAVER: Reed-Solomon de-interleaver fault.
RS UNCORRECT WORD: Reed-Solomon uncorrectable word fault.



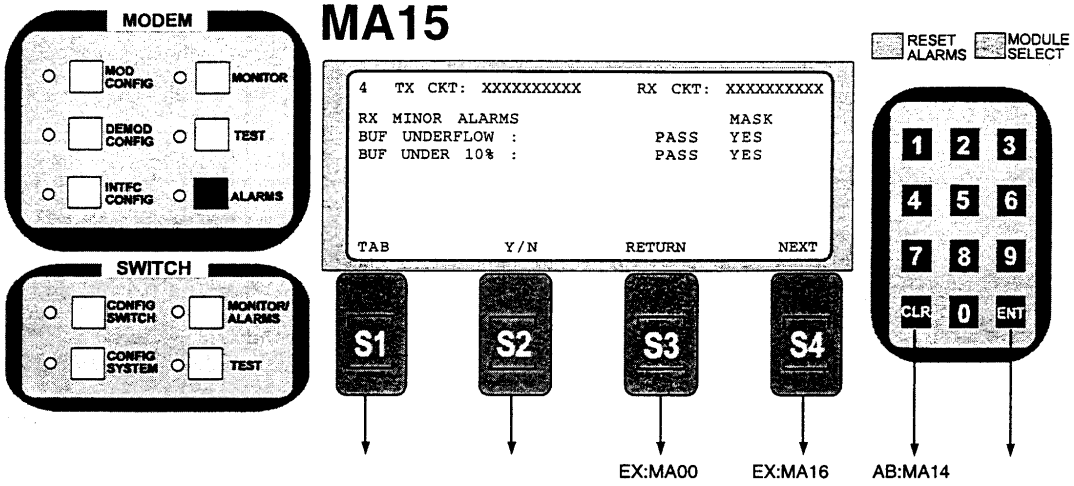
Notes: BER THRESHOLD: IBS BER threshold alarm.
RX 2047: Receive 2047 test pattern lock fault.



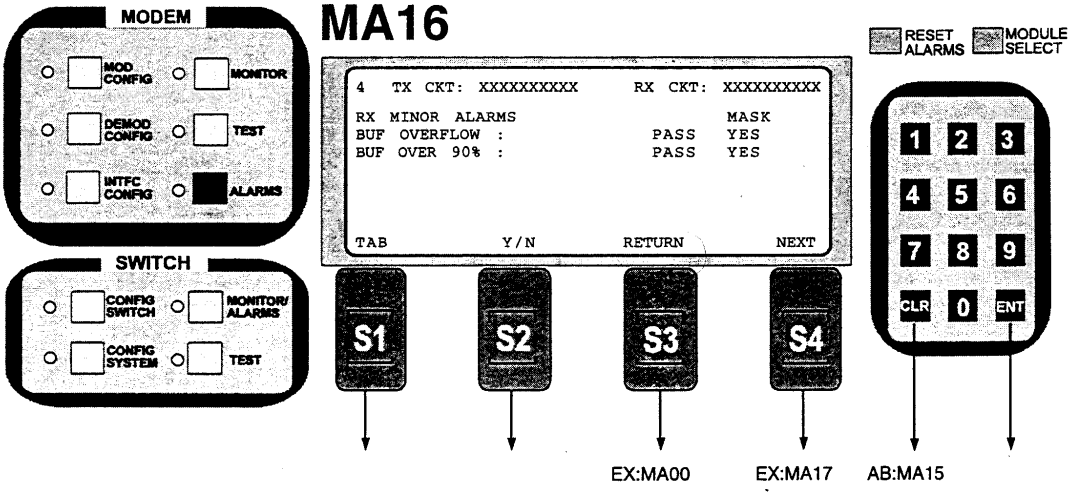
Notes: RX BUF CLK ACT: Indicates receive buffer clock activity.
RX DATA ACT: Indicates receive data activity.
RX SAT AIS ACT: Indicates receive satellite AIS activity.



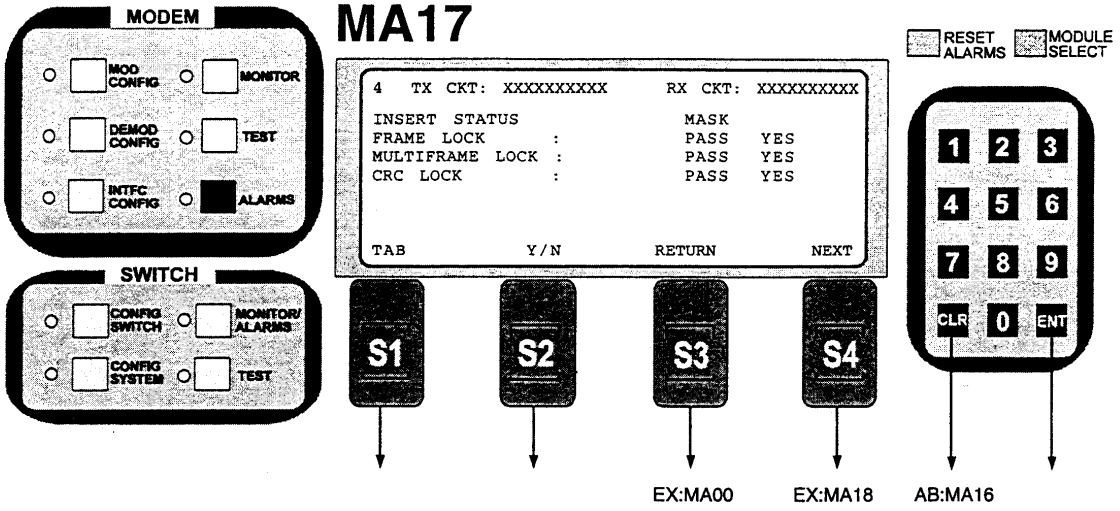
Notes: RX SAT CLK ACT: Indicates selected RX SAT clock source activity.
INSERT CLK ACT: Indicates selected Insert Buffer Clock source activity.
RX CLK FALLBACK: Indicates if a receive clock fallback occurred.



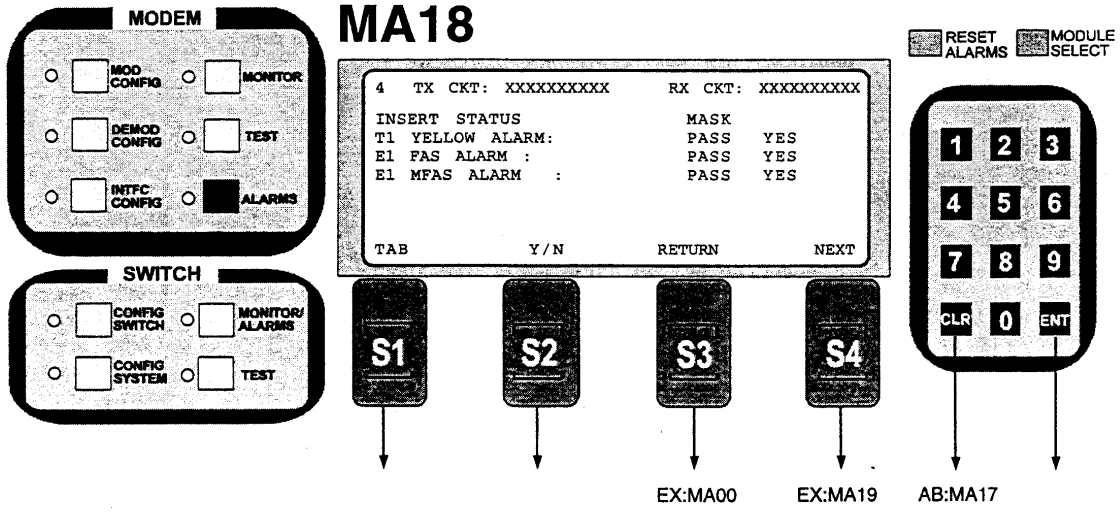
Notes: BUF UNDERFLOW: Indicates that the Doppler buffer underflow has occurred.
BUF Under 10%: Indicates that the Doppler buffer is about to underflow.



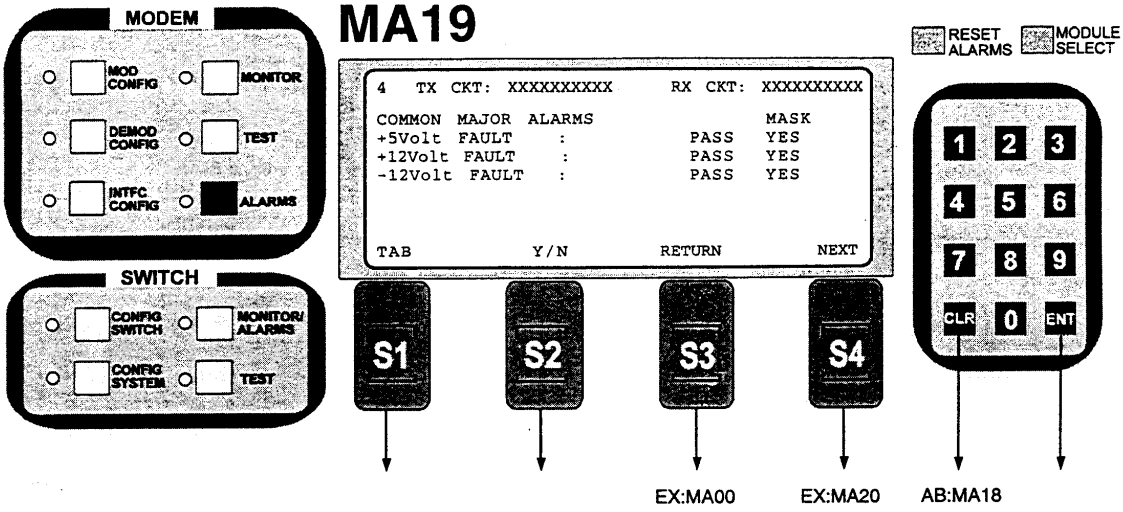
Notes: BUF OVERFLOW: Indicates that a Doppler buffer overflow has occurred.
BUF OVER 90%: Indicates that the Doppler buffer is about to overflow.



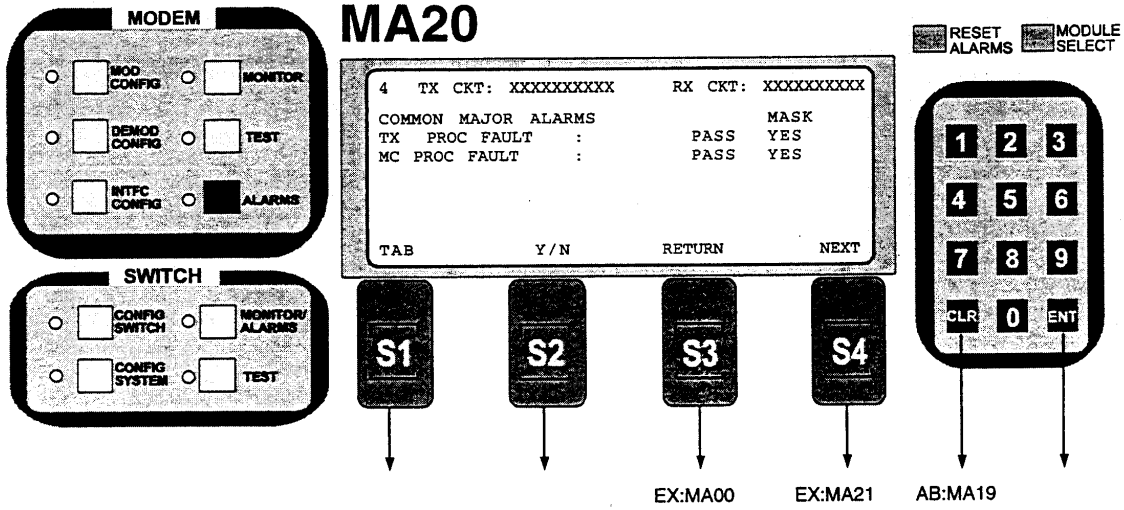
Note: FRAME LOCK: Insert frame sync lock fault.
MULTIFRAME LOCK: Insert multi-frame sync lock fault. Valid only in PCM30 and PCM30C.
CRC LOCK: Insert CRC lock fault. Valid only in T1ESF, PCM30 and PCM30C.



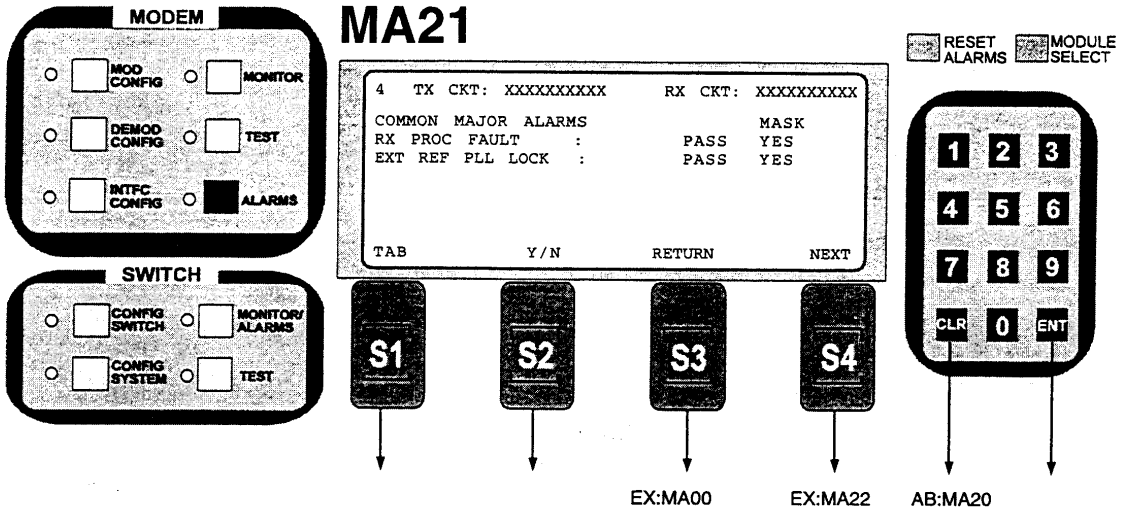
Note: T1 YELLOW ALARM: Drop T1 Tellow Alarm Fault. Valid only in T1_ESF, T1D4 and SLC96.
E1 FAS ALARM: Drop E1 FAS Alarm. Valid only in PCM30, PCM30C, PCM31 and PCM31C.
E1 MFAS ALARM: Drop E1 MFAS Alarm. Valid only in PCM30, PCM30C, PCM31 and PCM31C.



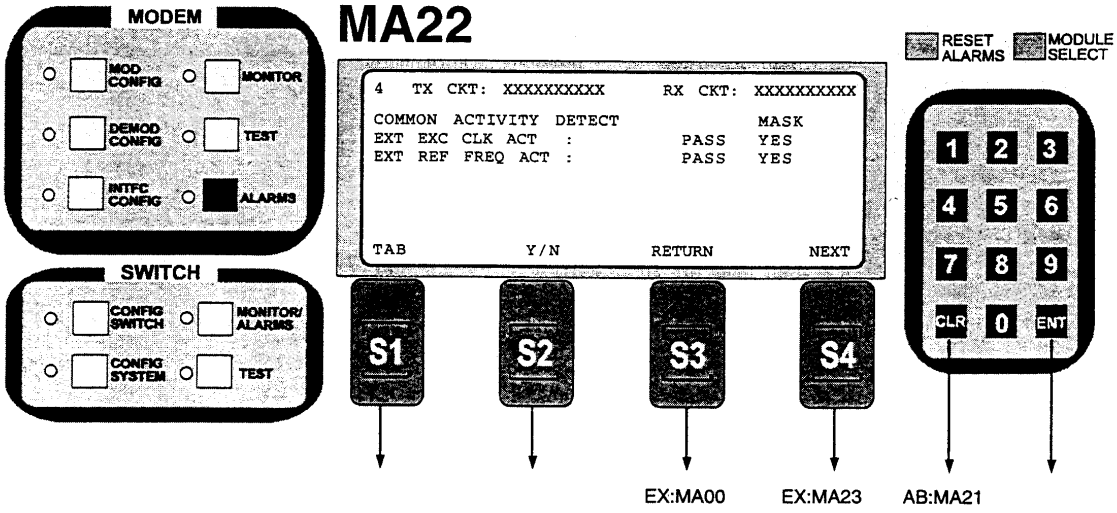
Note: +5V: Indicates +5 volt power supply voltage out of range.
+12V: Indicates +12 volt power supply voltage out of range.
-12V: Indicates -12 volt power supply voltage out of range.



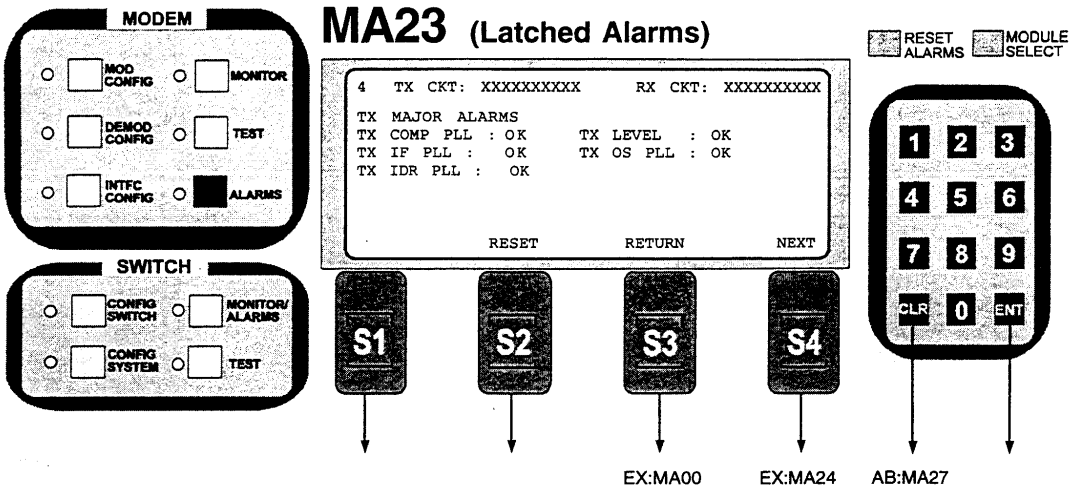
Note: TX PROC FAULT: Indicates TX hardware configuration has failed.
MC PROC FAULT: Indicates Common hardware configuration has failed.



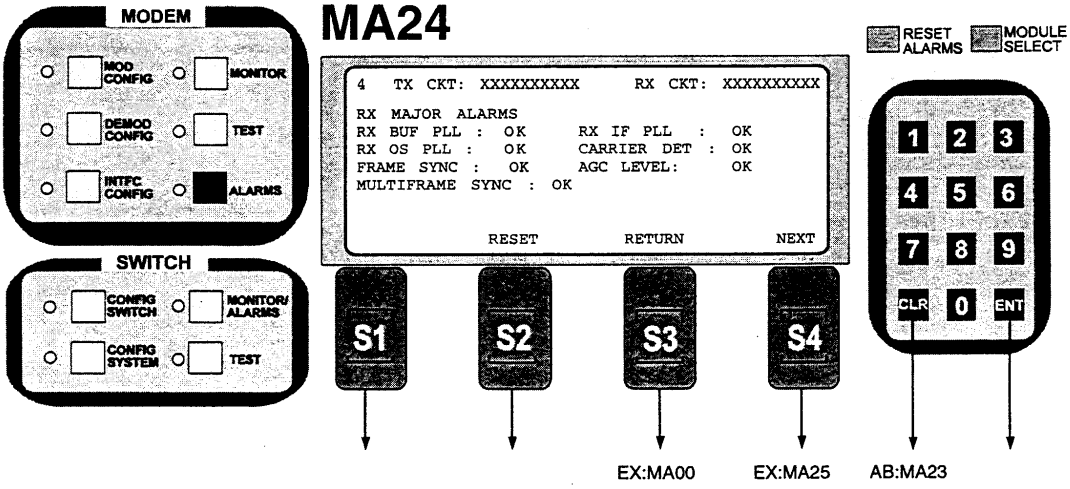
Note: RX PROC FAULT: Indicates RX hardware configuration failure.
EXT REF PLL LOCK: External Reference PLL lock fault.



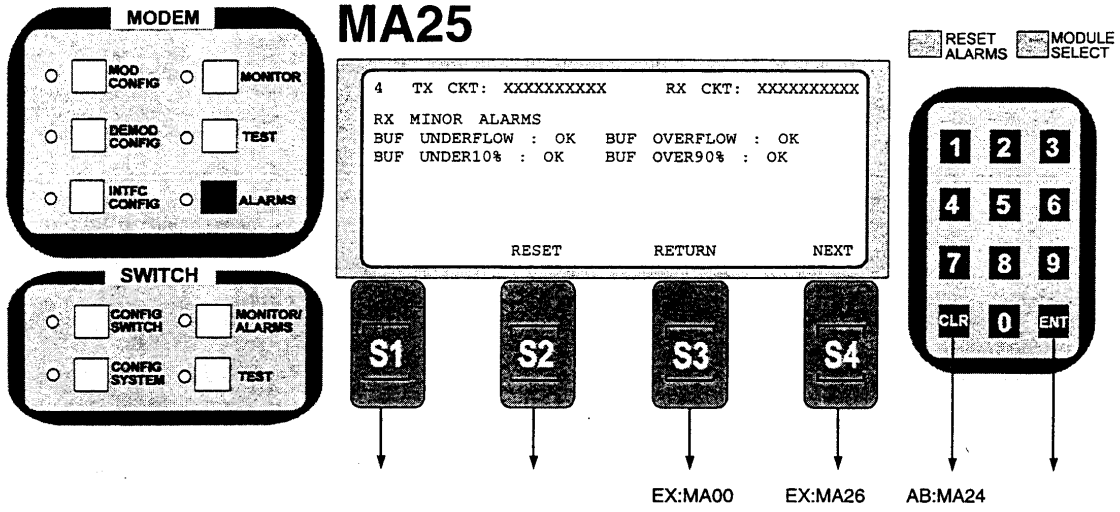
Note: EXT EXC CLK ACT: Indicates External EXC Clock source activity
EXT REF FREQ ACT: Indicates External Reference Frequency clock source activity



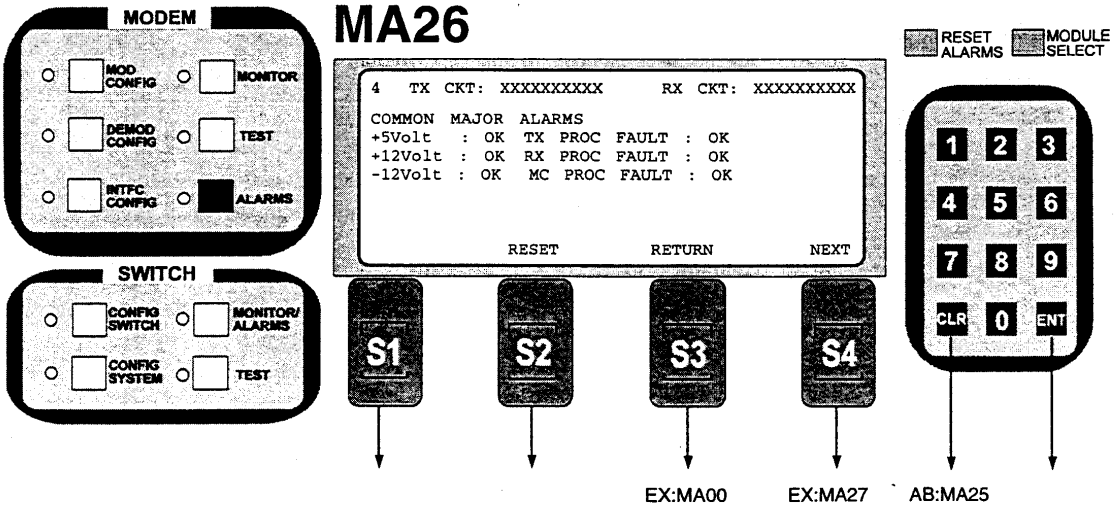
Note: TX COMP PLL: Transmit composite clock PLL lock fault.
TX IF PLL: Transmit IF synthesizer PLL lock fault.
TX IDR PLL: Transmit IDR OLL lock fault.
TX LEVEL: Transmit level fault.
TX OS PLL: Transmit oversample PLL lock fault.



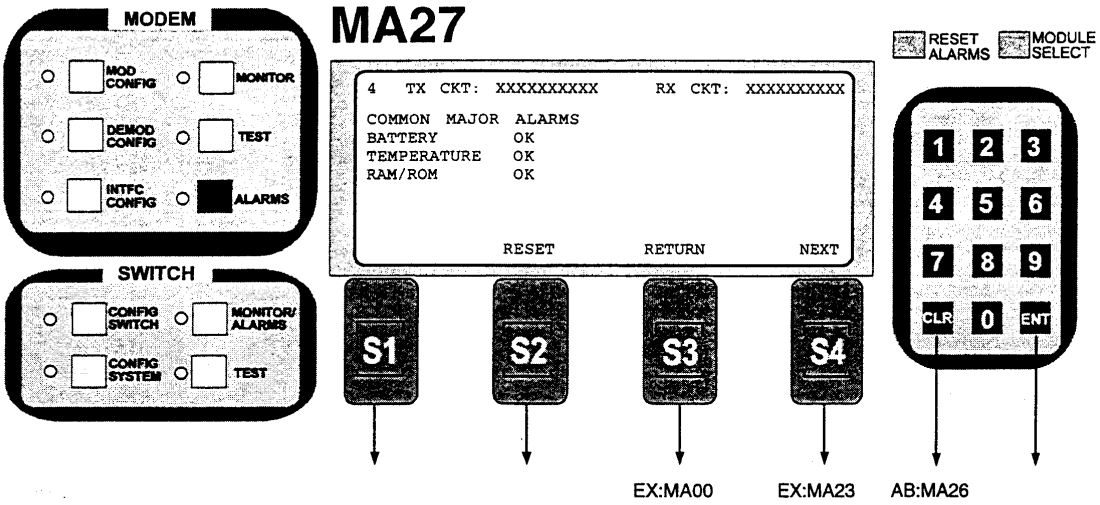
Note: RX BUF PLL: Indicates that the buffer clock PLL was not locked.
RX OS PLL: Indicates that the RX Oversample clock PLL was not locked.
FRAME SYNC: Indicates that the Framing Unit was unable to find the expected framing pattern.
MULTIFRAME SYNC: Indicates that the Framing Unit was unable to find the expected framing pattern.
RX IF PLL: Receive IF synthesizer PLL lock fault.
CARRIER DET: Decoder Lock
AGC LEVEL: AGC Level OK



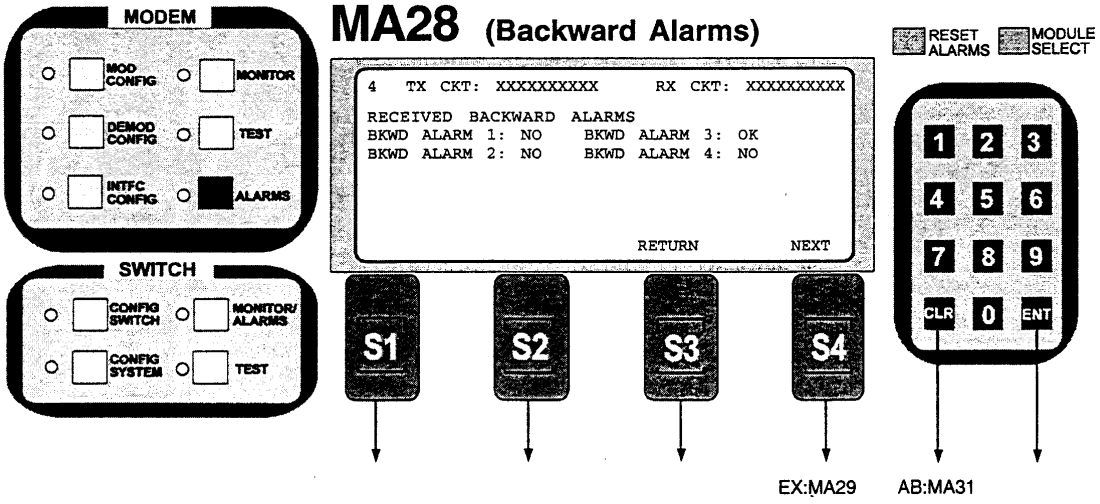
Note: BUF UNDERFLOW: Indicates that the Doppler buffer underflow has occurred.
BUF Under 10%: Indicates that the Doppler buffer is about to underflow.
BUF OVERFLOW: Indicates that a Doppler buffer overflow has occurred.
BUF OVER 90%: Indicates that the Doppler buffer is about to overflow.



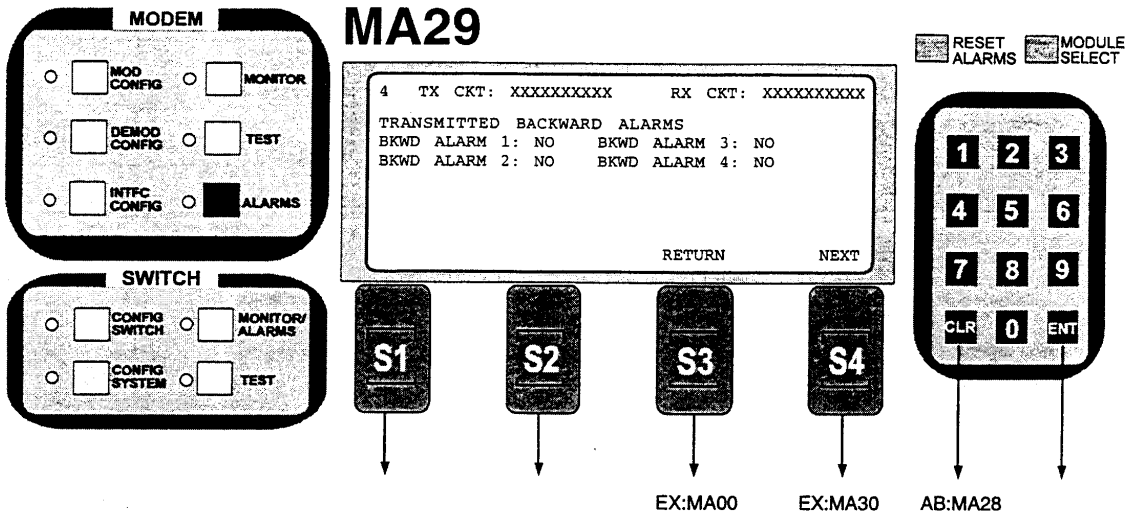
Note: +5V: Indicates +5 volt power supply voltage out of range.
+12V: Indicates +12 volt power supply voltage out of range.
-12V: Indicates -12 volt power supply voltage out of range.



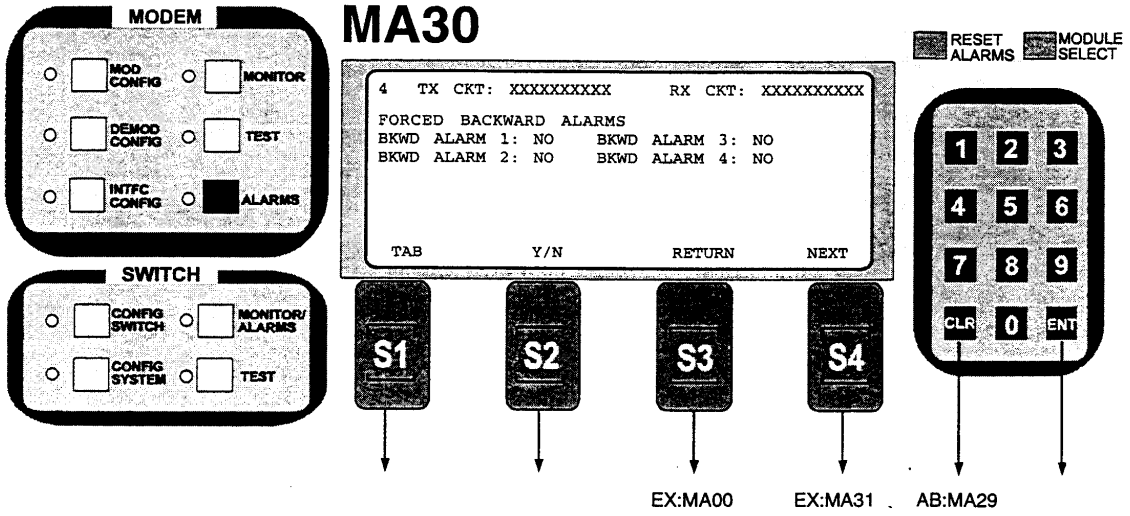
Notes: BATTERY: Indicates the internal clock battery is low.
TEMPERATURE: Indicates that the internal temperature is out of range.
RAM/ROM: Indicates M&C Memory Fault.



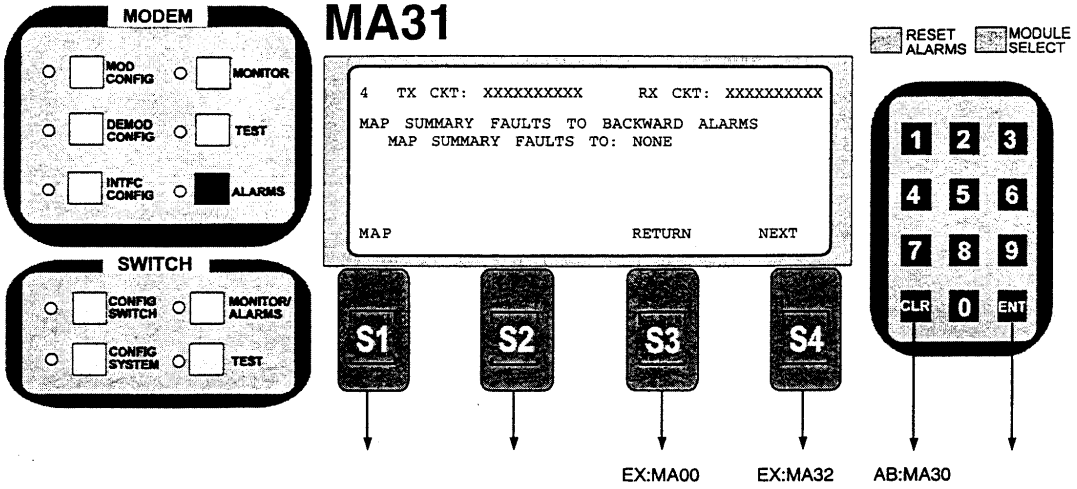
Note: Received Backward alarms 1 through 4.



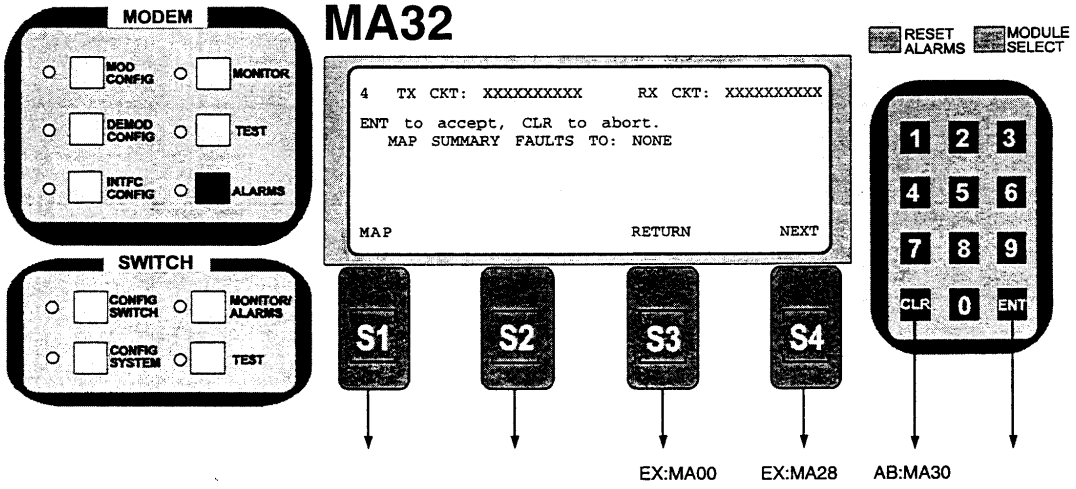
Note: Transmitted Backward Alarms 1 through 4.



Note: Forced Backward Alarms 1 through 4.

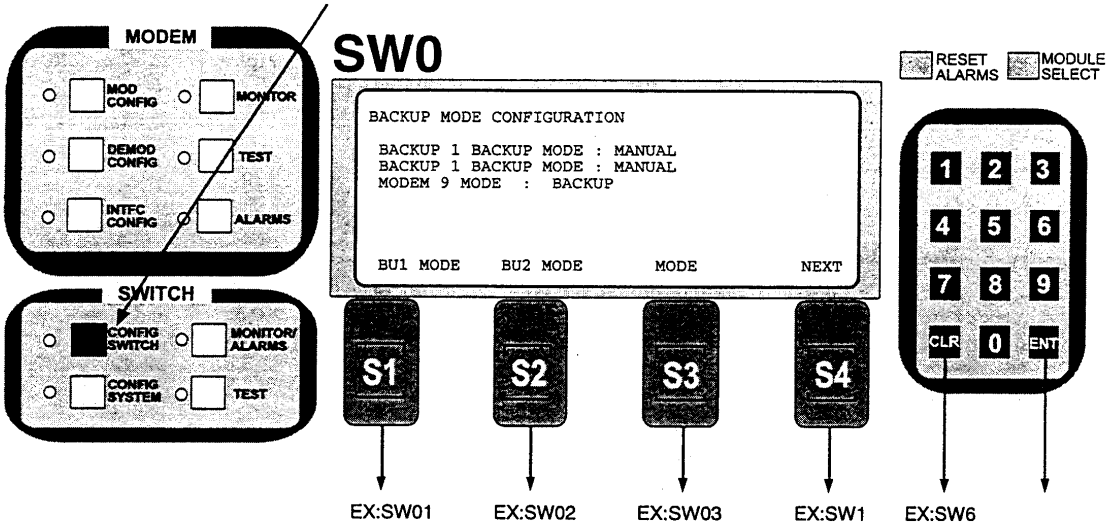


Note: Maps the summary faults to any one of the backward alarms. For 1/15 framing, only Backward Alarm 1 is valid. All four Backward Alarms are valid for 96K Framing.



3.15 RCS10 Switch Configuration Front Panel Menu Screens

The following screens are accessed by depressing the CONFIG SWITCH button located on the SWITCH section of the RCS10 on the lower left corner of the front panel.

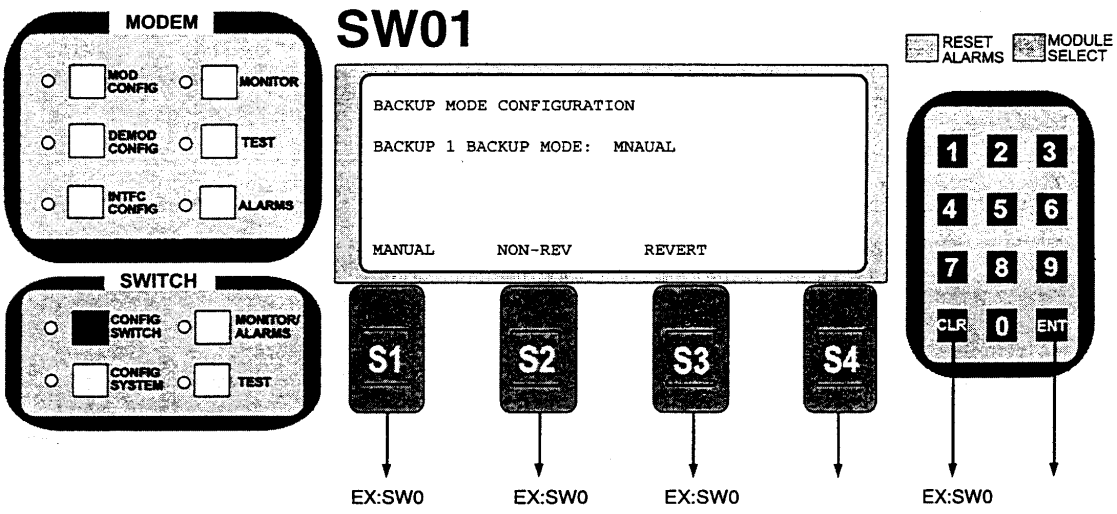


Notes:

The RCS10 Switch section must be programmed to select the mode of backup operation for backup channels 1 and 2. If channel 9 is configured as a prime channel (Traffic) , the selections for backup channel 2 will be unavailable.

Programming steps:

1. Press BU1 MODE to configure the mode of backup operation for backup channel 1 (channel 0).
2. Press BU2 MODE to configure the mode of backup operation for backup channel 2 (channel 9). The label for this key will not be displayed if channel 9 is configured as a prime channel (Traffic).

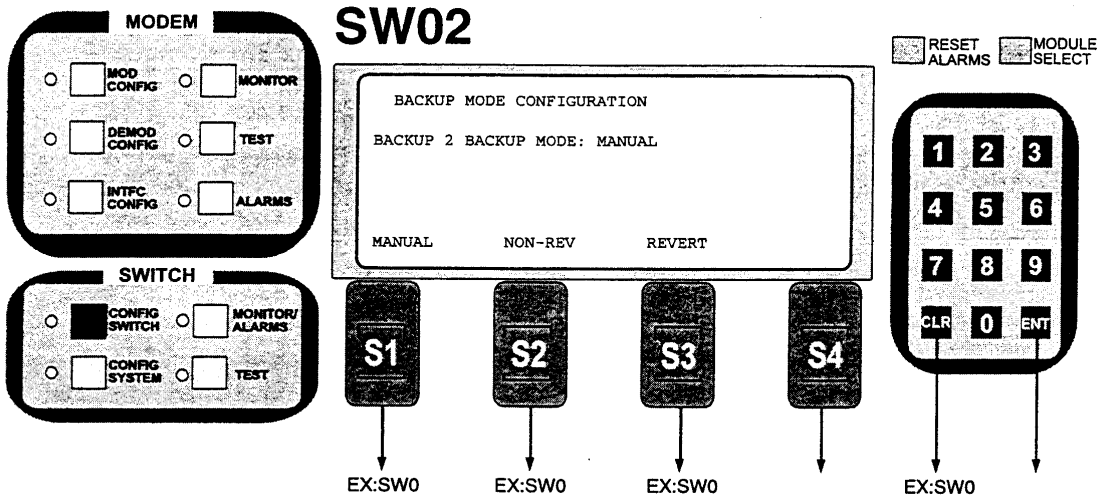


Notes:

The RCS10 must be programmed to select the mode of backup operation for backup channel 1 (channel 0). Three backup modes are available: Manual, Non-Revertive and Revertive. Manual operation allows the operator to force backups to occur even if prime channel modems have not failed. Non-Revertive operation allows automatic backups to occur when prime channels fail, but once a channel is backed up, it will remain backed up until manually reset by the operator. Revertive operation allows automatic backups to occur when prime channels fail, and after a channel is backed up, if the prime channel clears its error, the backup can become available for another prime channel. To minimize switching, the backup unit will not reset into its Hot Standby mode.

Programming Steps:

1. Press MANUAL to configure backup channel 1 for manual operation. The switch parameter table will be updated immediately.
2. Press NON-REV to configure backup channel 1 for automatic non-revertive operation. The switch parameter table will be updated immediately.
3. Press REVERT to configure backup channel 1 for automatic revertive operation. The switch parameter table will be updated immediately.
4. Press CLR or RETURN to abort programming (no switch parameters will be changed). The display will return to Config Switch Screen 01 (Backup Mode Configuration).

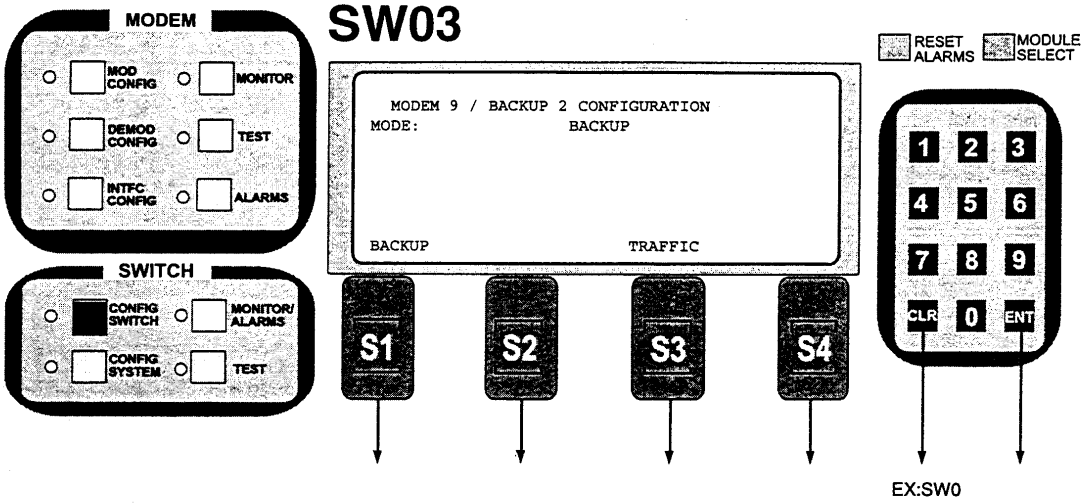


Notes:

The RCS10 must be programmed to select the mode of backup operation for backup channel 2 (prime channel 9), if this channel is configured as a backup channel. Three backup modes are available: Manual, Non-Revertive, and Revertive. Manual operation allows the operator to force backups to occur even if prime channel modems have not failed. Non-Revertive operation allows automatic backups to occur when prime channels fail, but once a channel is backed up, it will remain backed up until manually reset by the operator. Revertive operation allows automatic backups to occur when prime channels fail, and after a channel is backed up, if the prime channel clears its error, the backup can become available for another prime channel.

Programming Steps:
1. Press MANUAL to configure backup channel 2 for manual operation. The switch parameter table will be updated immediately.
2. Press NON-REV to configure backup channel 2 for automatic non-revertive operation. The switch parameter table will be updated immediately.
3. Press REVERT to configure backup channel 2 for automatic revertive operation. The switch parameter table will be updated immediately.
4. Press CLR or RETURN to abort programming (no switch parameters will be changed). The display will return to Config Switch Screen 0 (Backup Mode Configuration).

Notes:

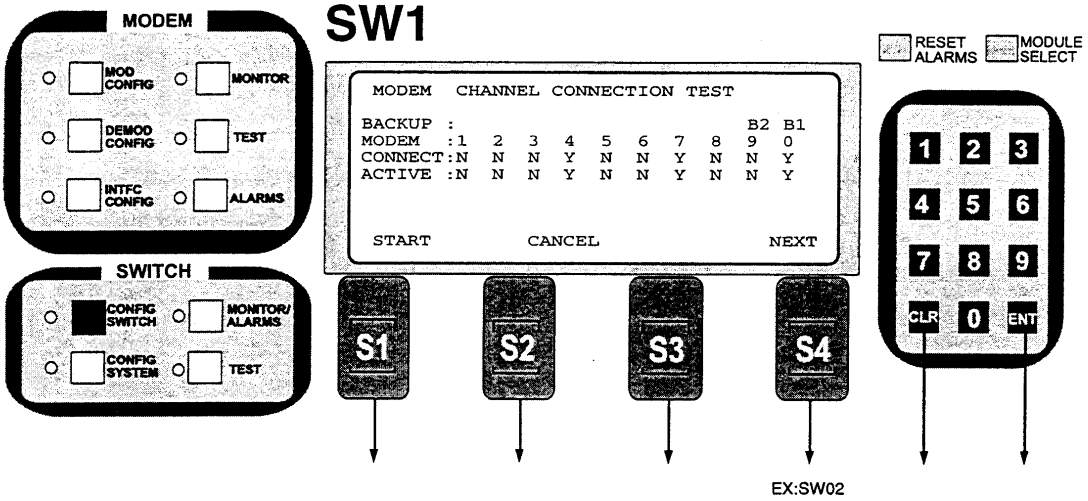


Notes:

The RCS10 must be programmed to select the mode operation for channel 9. The channel 9 modem can operate as a prime, a preemptable prime, or a dedicated backup.

Programming steps:

1. Press BACKUP to configure channel 9 as a dedicated backup channel. The switch parameter table will be updated immediately. In this mode, channel 9 cannot be used as a prime channel, and modem 9 will not be connected to up/down converters.
2. Press PREEMPT to configure channel 9 as a preemptable prime channel. The switch parameter table will be updated immediately. In this mode, channel nine will normally carry low priority data, but will drop the low priority data channel and serve as a backup if any of the modems on the dedicated prime channels 1 to 8 fail.
3. Press TRAFFIC to configure channel 9 as a dedicated prime channel. The switch parameter table will be updated immediately. In this mode, channel 9 will be connected to an up/down converter and will work the same as the other dedicated prime channels. Also, channel 9 data and IF will be switched to the backup channel if the modem connected to channel 9 fails.
4. Press CLR or RETURN to abort programming (no switch parameters will be changed).



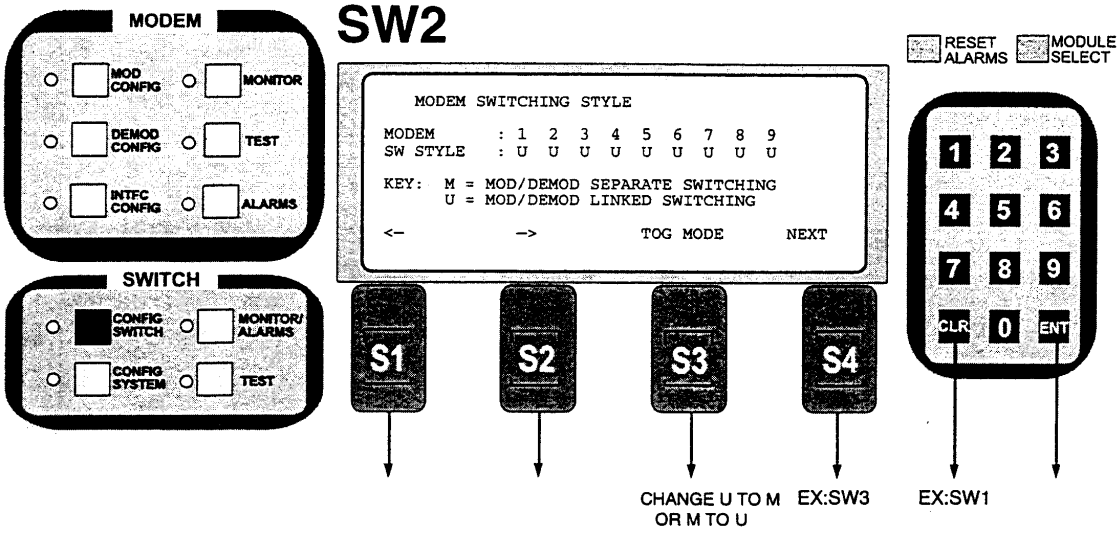
EX:SW02

Notes:

This screen allows the communication channels between the RCS10 and all modems connected to the system to be tested. If the test fails for one or more channels, check the parameter entries for screens Config 0 and Config 1. The '*' indicates communication in progress, and will move between all configured channels before the test is complete.

Programming steps:

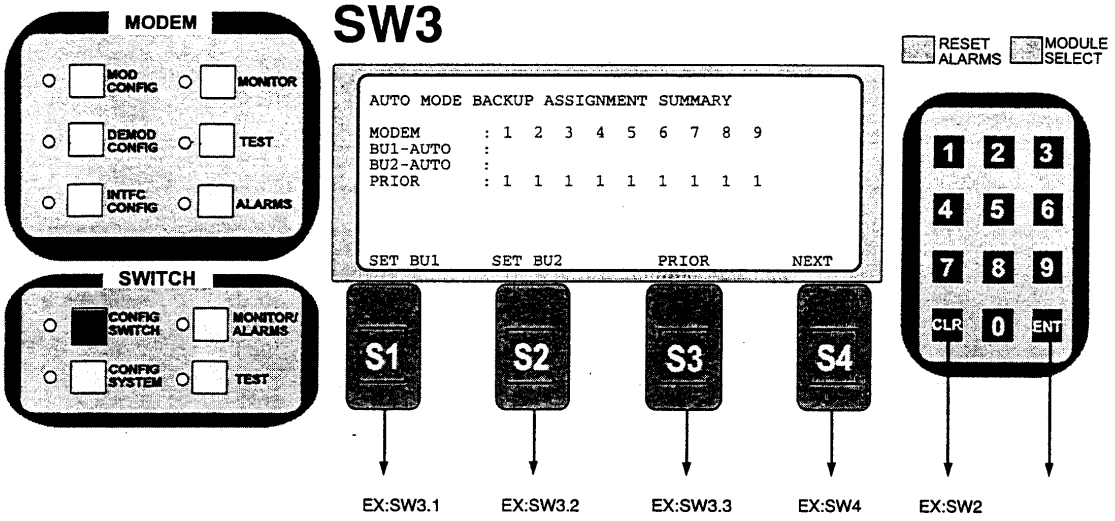
1. Press START to begin the test. The '*' will move from channel 0 to all configured channels.
2. A 'Y' in the ACTIVE row indicates normal communication, and an 'N' indicates communication failure between the RCS10 and the modems. The MODEM row lists the communication channels for each modem. For example, a 'N' in the ACTIVE row under number 4 indicates a problem with the modem connected to channel 4 (as shown in the above figure). Possible problems could be a bad connection to the modem 4 remote port, or an incorrect address for modem 4, either at the modem or at the RCS10.
3. Note that this test is performed approximately every 30 seconds by the RCS10, and the '*' may appear without pressing the START key.



Notes:

The RCS10 must be programmed to either switch the modulator and demodulator together (linked switching) or to switch the modulator and demodulator separately (independent switching). When a prime channel is programmed for linked switching, both the modulator and the demodulator will be switched to a backup channel if either the modulator or the demodulator fail. When a prime channel is programmed for independent switching, only the modulator will be backed up if the modulator fails, and only the demodulator will be backed up if the demodulator fails.

Programming steps:
1. Press <— or —> to move the flashing cursor the channel to be programmed
2. Press <TOG MODE> to switch from U to M or vice-versa.
3. 'U' indicates a channel is configured as linked switching, 'M' indicates a channel is configured for independent switching.
4. Select the desired switching styles for each prime channel.
5. Press CLR or NEXT to abort programming (no switch parameters will be changed).
6. Press ENT to load the information on the screen into the switch parameter table.



Notes:

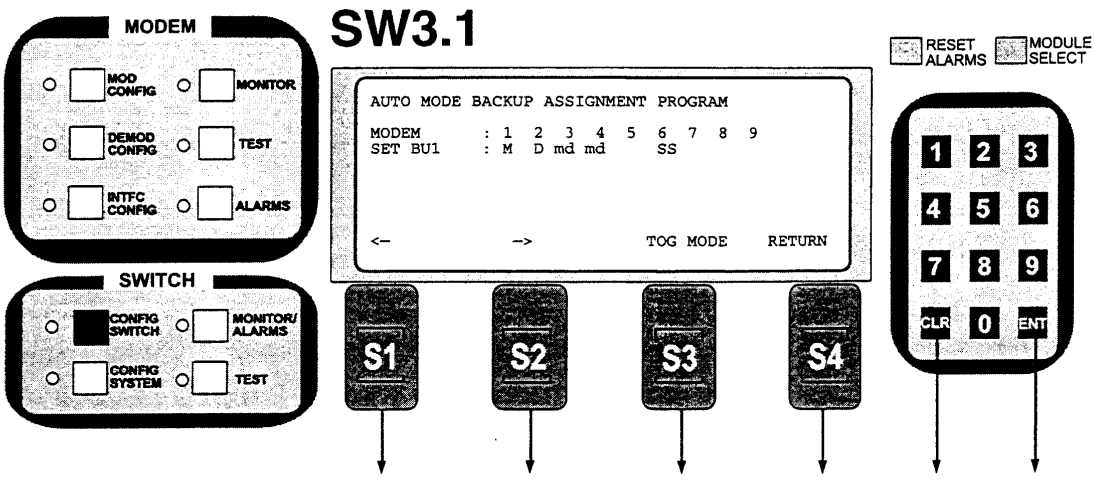
The RCS10 must be programmed with the prime channels used for automatic backup protection. There are up to two backup channels available and up to nine prime channels. For the above screen, the following letter codes indicate backup assignment information:

'M' - indicates a modulator is programmed for automatic backup and is currently in hot standby.
'D' - indicates a demodulator is programmed for automatic backup and is currently in hot standby.
'm' - indicates a modulator is programmed for automatic backup.
'd' - indicates a demodulator is programmed for automatic backup.
'B' - indicates a modulator or demodulator is currently backed up.
'S' - indicates a modulator or demodulator is in SERVCE MODE.
'*' - indicates a hot standby or backup is in progress.

Each line on the above screen summarizes auto backup assignment information, and is described below:

Programming Steps:

1. The 'MODEM' line on the display shows all of the prime channels available for protection. This line will display either the numbers 1 to 8 (if prime channel 9 is configured as a backup, then this line will display numbers 1 to 9).
2. The 'BU1-AUTO' line on the above display shows the prime channels that are programmed for automatic backup by backup channel 1. This line will have the label 'BU1-MANUAL' if backup channel 1 is configured for manual backup. Note that the automatic backup assignments can be programmed into the RCS10 while the backup channel is in manual mode; the auto backup assignments will then become active when the backup channel is placed into auto-revertive or auto-non-revertive backup mode. On the above display, prime channels 1 to 4 are programmed to backup channel 1, and prime channel 2 modulator and demodulator are presently backed up by backup channel 1.
3. The 'BU2-MANUAL line on the above display shows the prime channels that are programmed for automatic backup by backup channel 2. This line will have the label 'BU2-AUTO' if backup channel 2 is configured for auto-revertive or auto-non-revertive backup. On the above display, prime channels 5 to 8 are programmed to backup channel 2, and prime channel 5 modulator and demodulator are in hot standby.
4. The 'PRIOR' line on the above display shows the priority assignments for each prime channel. Priority numbers range from 1 to 9, with 1 being the highest priority and 9 being the lowest priority. Prime channels with the highest priority (1) assigned to a backup channel will be placed in hot standby by that backup channel. When 2 or more prime channels have the same highest priority, then the lowest channel number will be placed in hot standby. Priorities are also used during automatic revertive backups, if more prime channels are faulted then there are backups available, then the highest priority prime channels will be backed up and other priority failed prime channel will drop traffic. On the above display, all the prime channels are configured as highest priority, thus the lowest channel numbers determine hot standby.



EX:SW3 EX:SW3

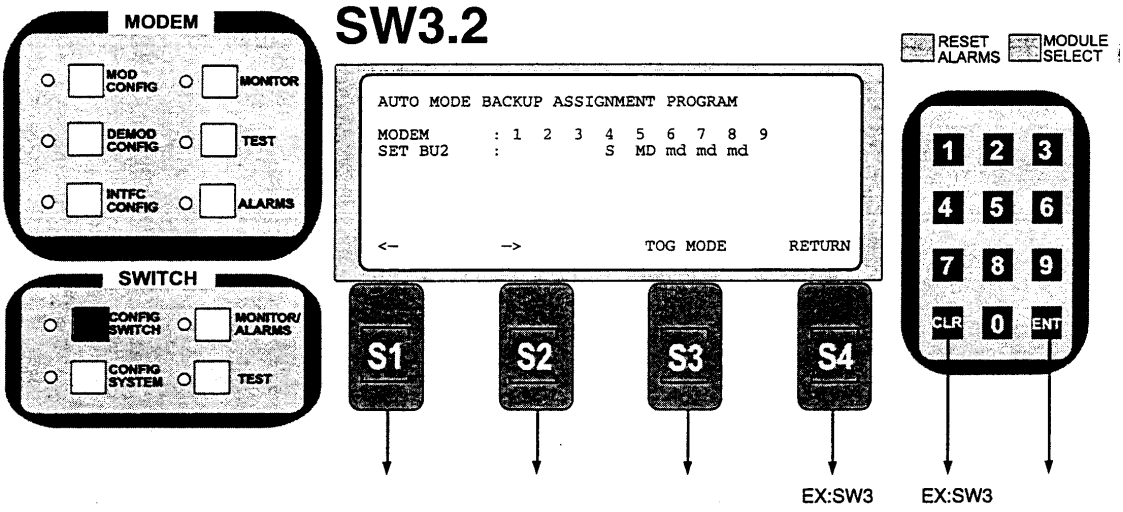
Notes:

This screen allows programming the RCS10 backup channel 1 to provide automatic switching for any or all of the prime channel modems. The following letter codes indicate backup assignment information for backup channel 1 on this screen:

'M' - indicates a modulator is programmed for automatic backup and is currently in hot standby.
'D' - indicates a demodulator is programmed for automatic backup and is currently in hot standby.
'm' - indicates a modulator is programmed for automatic backup.
'd' - indicates a demodulator is programmed for automatic backup.
'B' - indicates a modulator or demodulator is currently backed up.
'S' - indicates a modulator or demodulator is in SERVICE MODE.'
"*' - indicates a hot standby or backup is in progress.

The above screen shows that prime channel 1 modulator is in hot standby, prime channel 2 demodulator is in hot standby, and prime channels 3 and 4 have modulators and demodulators assigned to backup channel 1.

Programming steps:
1. Press <— or —> to move the flashing cursor the channel to be programmed
2. Press <TOG MODE> to switch from ' ' , to 'm', to 'd' to 'md' or vice-versa. The independent switching modes 'm' and 'd' will not be available if a channel is programmed for linked switching. (See Config Switch Screen 2). A blank (' ') indicates a prime channel is not assigned to backup 1, an 'm' indicates the modulator only is assigned to backup 1, a 'd' indicates the demodulator only is assigned to backup 1, and a 'md' indicates the modulator and demodulator is assigned to backup 1.
3. Select the desired backup 1 automatic backup assignments for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



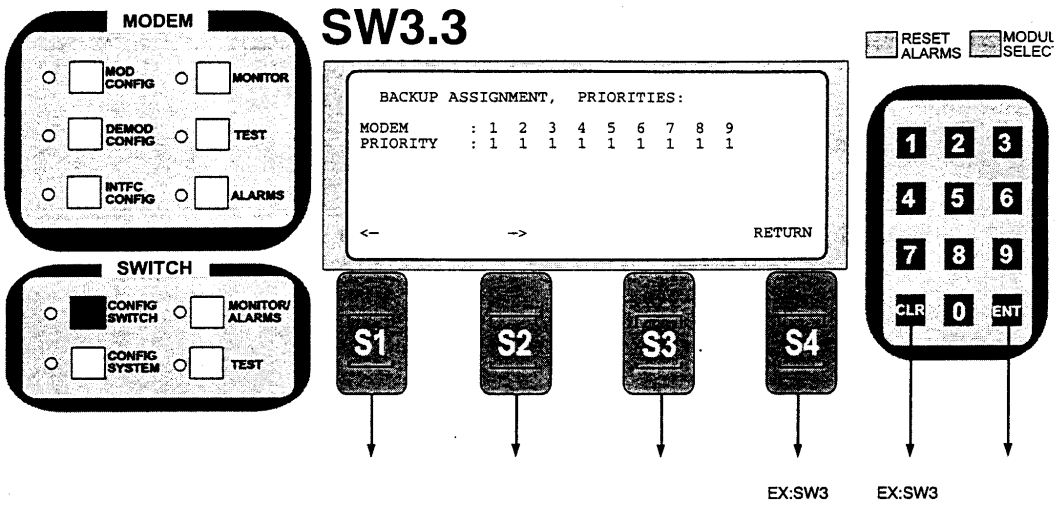
Notes:

This screen allows programming the RCS10 backup channel 2 to provide automatic switching for any or all of the prime channel modems. The following letter codes indicate backup assignment information for backup channel 2 on this screen:

'M' - indicates a modulator is programmed for automatic backup and is currently in hot standby.
'D' - indicates a demodulator is programmed for automatic backup and is currently in hot standby.
'm' - indicates a modulator is programmed for automatic backup.
'd' - indicates a demodulator is programmed for automatic backup.
'B' - indicates a modulator or demodulator is currently backed up.
'S' - indicates a modulator or demodulator is in 'SERVICE MODE.'
'*' - indicates a hot standby or backup is in progress.

The above screen shows that prime channel 5 modulator and demodulator are in 'Hot Standby' and prime channels 6 to 8 have modulators and demodulators assigned to backup channel 2.

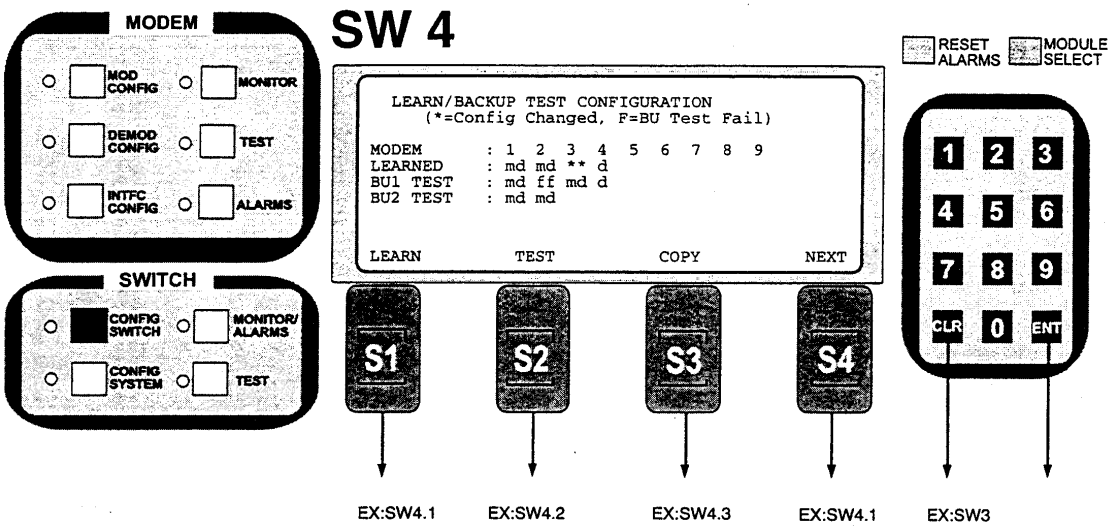
Programming steps:
1. Press <— or —> to move the flashing cursor the channel to be programmed
2. Press <TOG MODE> to switch from ' ', to 'm', to 'd' to 'md' or vice-versa. The independent switching modes 'm' and 'd' will not be available if a channel is programmed for linked switching (See Config Switch Screen 2). A blank (' ') indicates a prime channel is not assigned to backup 2, an 'm' indicates the modulator only is assigned to backup 2, a 'd' indicates the demodulator only is assigned to backup 2, and a 'md' indicates the modulator and demodulator is assigned to backup 2.
3. Select the desired backup 2 automatic backup assignments for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



Notes:

This screen allows programming the RCS10 with priorities for each prime channel. '1' indicates the highest priority channel and '9' indicates the lowest priority channel. The highest priority prime channel for each backup channel will have its modulator and/or demodulator placed in hot standby. Also, for revertive backup mode, the highest priority channel modulators and demodulators will be backed up if multiple channels fail. The above screen shows all prime channels are assigned as the highest priority. In this case, the lowest channel number (channel 1) will be placed in hot standby.

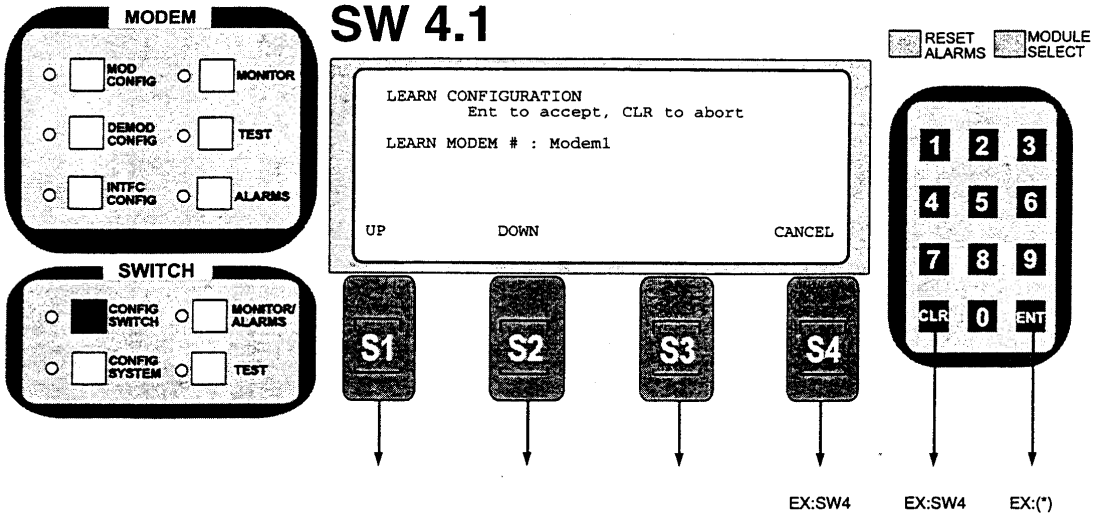
Programming steps:
1. Press <— or —> to move the flashing cursor the prime channel to be programmed.
2. Use the numeric keypad to enter the priority for the selected prime channel.
3. Select the desired priorities for each prime channel for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



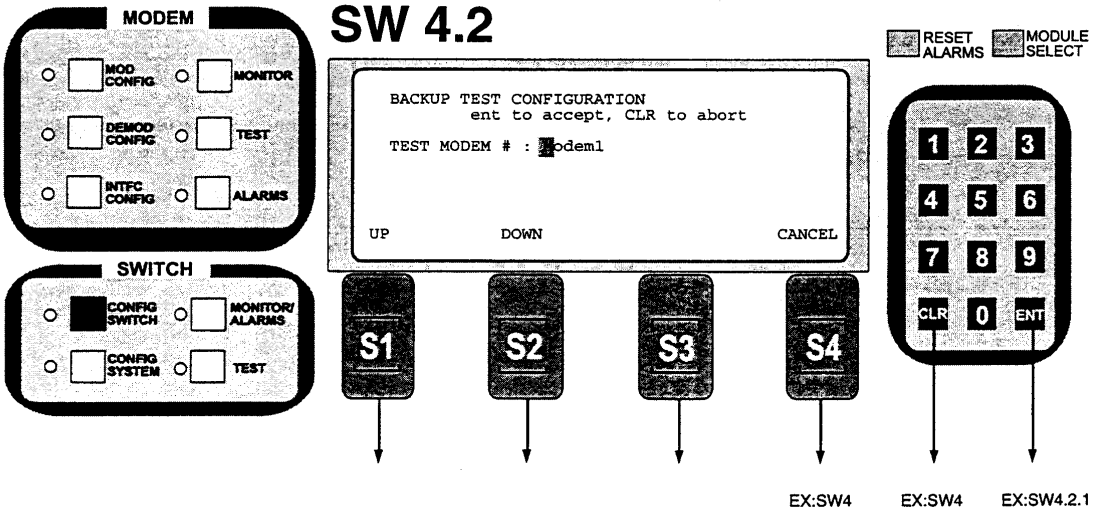
Notes:

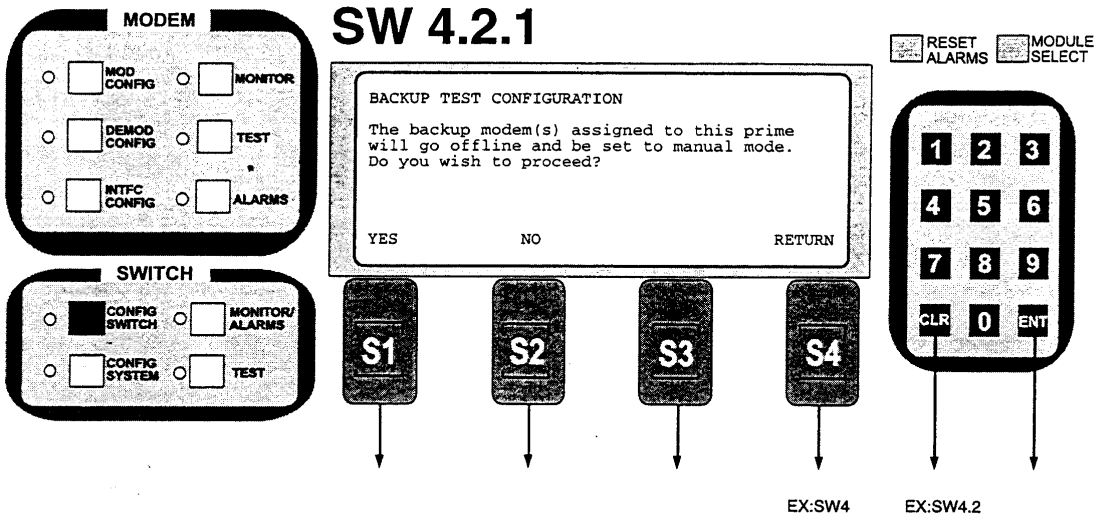
The Learn/Backup Test Configuration Screen letter codes mean the following:

'*' - Indicates a change in the prime's learned modulation or demodulation configuration.
'm' - For the LEARNED status line, it indicates that the configuration of a modulator programmed for automatic backup is learned. For the BUTEST status line, it indicates that a modulator's learned configuration is backup tested successfully.
'd' - For the LEARNED status line, it indicates that the configuration of a demodulator programmed for automatic backup is learned. For the BUTEST status line, it indicates that a demodulator's learned configuration is backup tested successfully.
'f' - The corresponding prime's learned configuration was backup tested and failed. BACKUP1 and/or BACKUP2 are unable to successfully backup the learned prime configuration. Example: In the above screen BACKUP1 is unable to backup Prime2 modem configuration. BACKUP2 can backup Prime2.

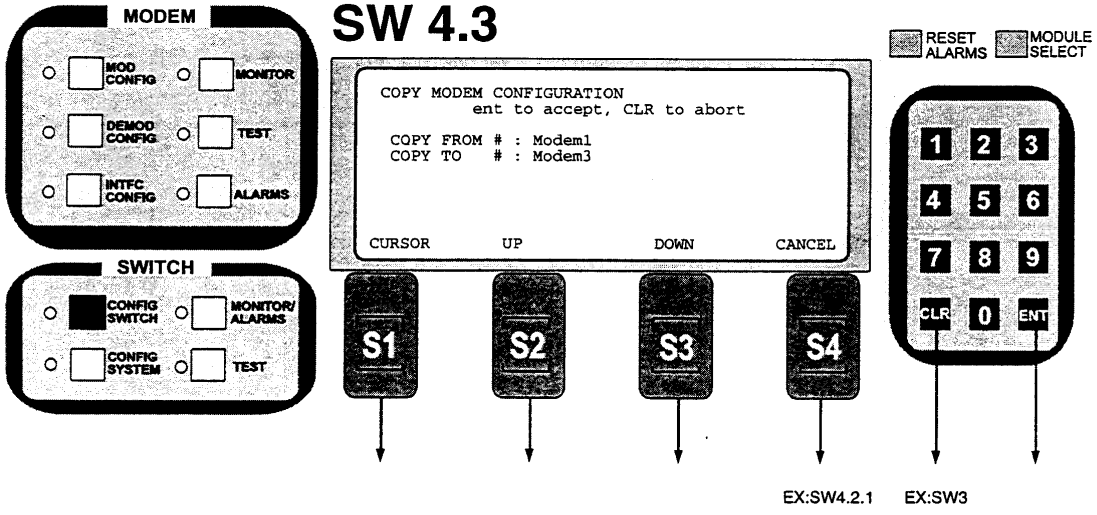


* Error popup screens will be displayed in case of failure



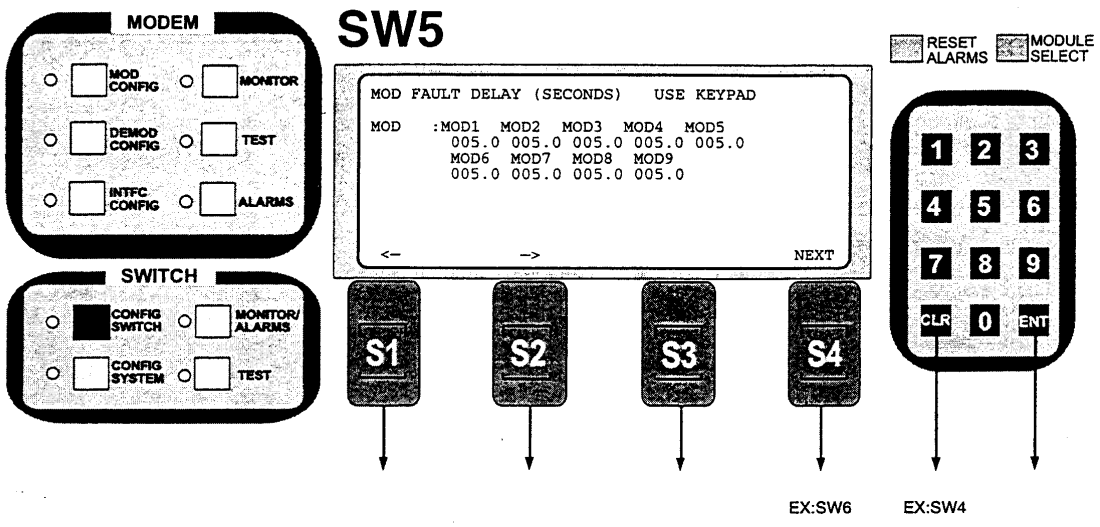


* Error popup screens will be displayed in case of failure



* Error popup screens will be displayed in case of failure

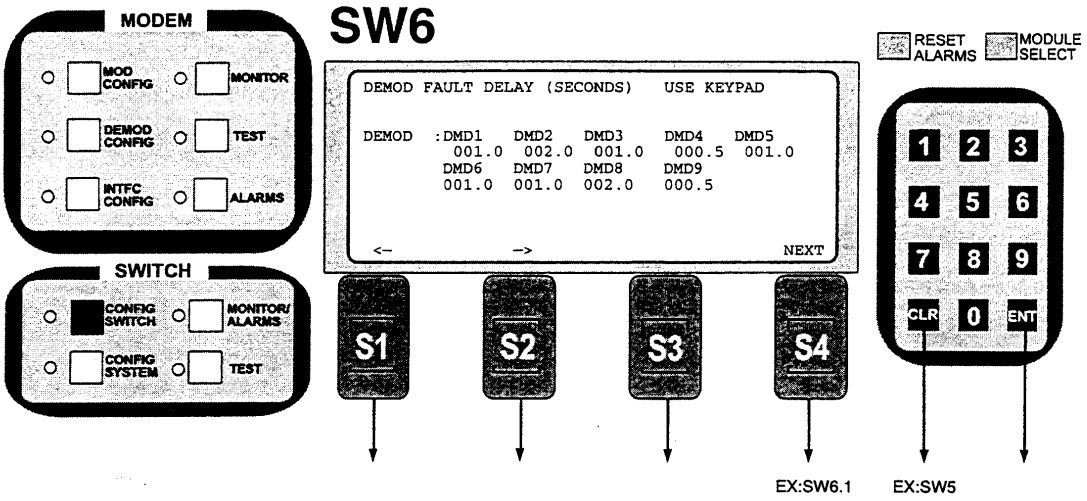
RCS10 Redundant Communication System — Operation



Notes:

This screen allows programming the modulator fault delays in seconds for each prime channel on the RCS20. The fault delays for a modulator are used to debounce the modulator faults, thus if a modulator fails, a timer is started and the failure will not be recognized by the RCS10 until the timer reaches fault delay seconds. The above screen shows that all nine prime channel modulators have a fault delay timer of 199.9 seconds. The fault delay can be from 0.0 seconds to 199.9 seconds.

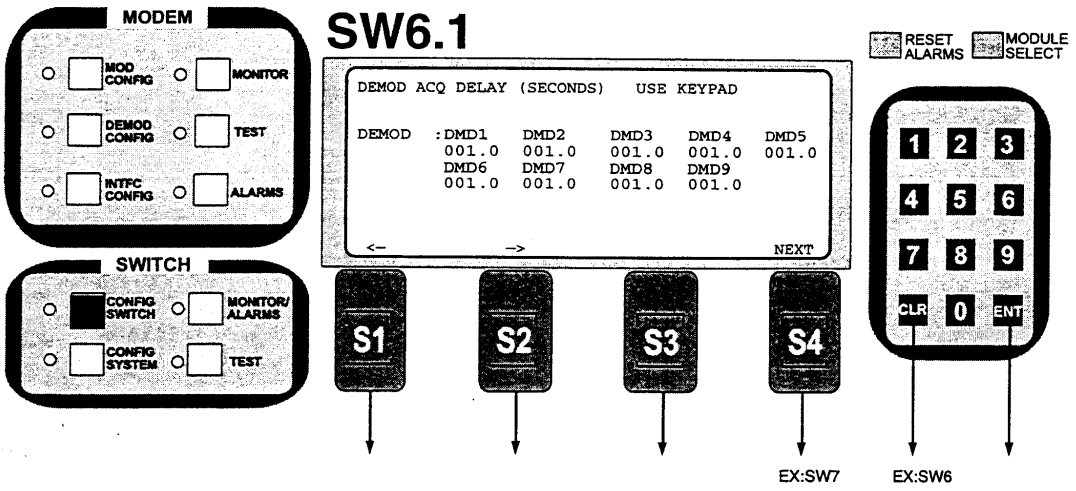
Programming steps:
1. Press <— or —> to move the flashing cursor to the prime channel to be programmed.
2. Use the numeric keypad to enter the modulator fault delay for the selected prime channel.
3. Select the desired modulator fault delays for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



Notes:

This screen allows programming the demodulator fault delays in seconds for each prime channel on the RCS10. The fault delays for a demodulator are used to debounce the demodulator faults, thus if a demodulator fails or loses signal lock, a timer is started and the failure will not be recognized by the RCS10 until the timer reaches fault delay seconds. The above screen shows that all nine prime channel demodulators have a fault delay timer of 199.9 seconds. The fault delay can be from 0.0 seconds to 199.9 seconds.

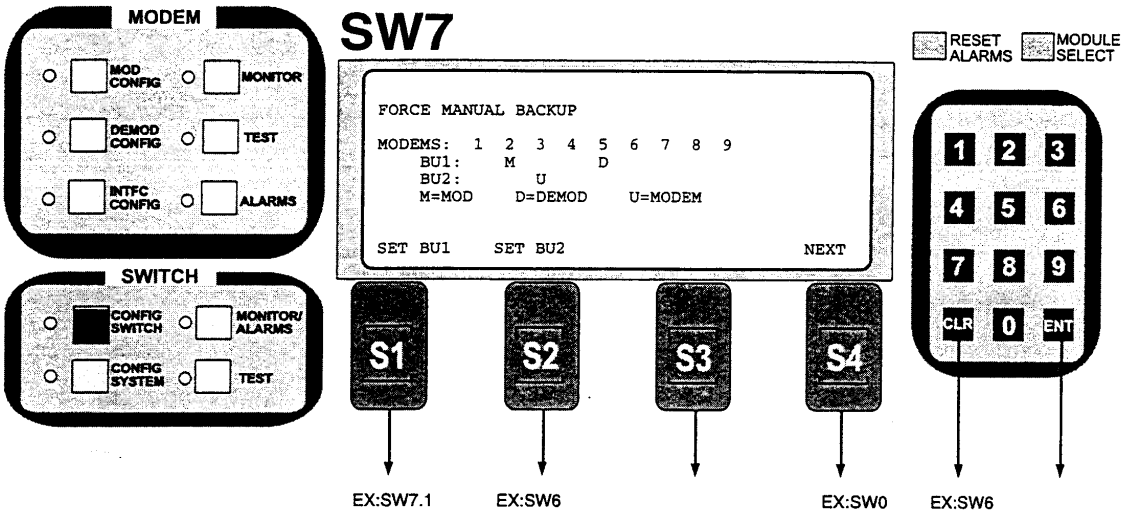
Programming steps:
1. Press <— or —> to move the flashing cursor to the prime channel to be programmed.
2. Use the numeric keypad to enter the demodulator fault delay for the selected prime channel.
3. Select the desired demodulator fault delays for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



Notes:

This screen allows programming the demodulator acquisition delays in seconds for each prime channel on the RCS10. The fault delays for a demodulator are used to debounce the demodulator faults, thus if a demodulator fails or loses signal lock, a timer is started and the failure will not be recognized by the RCS10 until the timer reaches fault delay seconds. The above screen shows that all nine prime channel demodulators have a fault delay timer of 1 second. The fault delay can be from 0.0 seconds to 199.9 seconds.

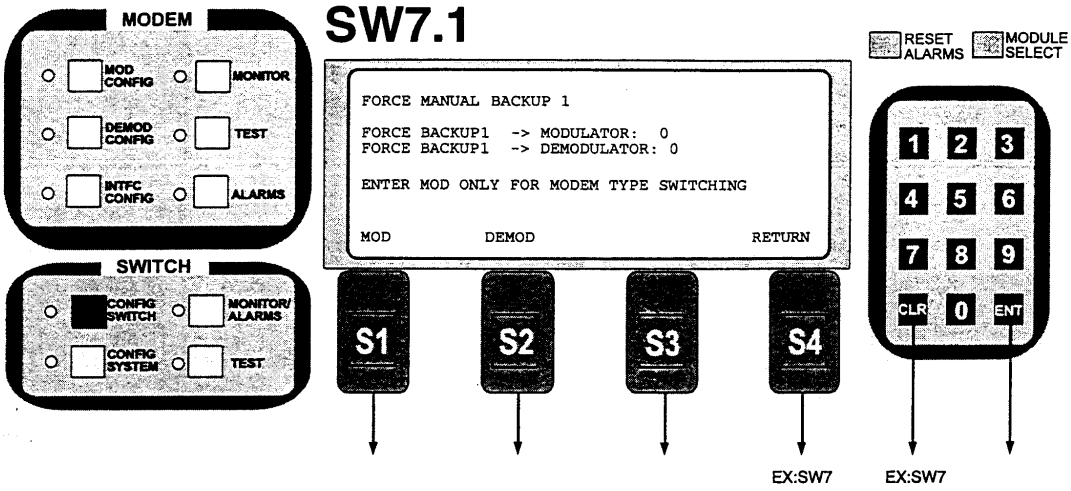
Programming steps:
1. Press <— or —> to move the flashing cursor to the prime channel to be programmed.
2. Use the numeric keypad to enter the demodulator fault delay for the selected prime channel.
3. Select the desired demodulator fault delays for each prime channel.
4. Press CLR or NEXT to abort programming (no switch parameters will be changed).
5. Press ENT to load the information on the screen into the switch parameter table.



Notes:

This screen allows switching prime channels into backup manually. A backup channel must be in manual mode to force prime channels into backup. The above display shows that prime channel 2 modulator is switched to backup channel 1 modulator, prime channel 5 demodulator is switched to backup channel 1 demodulator, prime channel 3 modulator and demodulator are switched to backup channel 2.

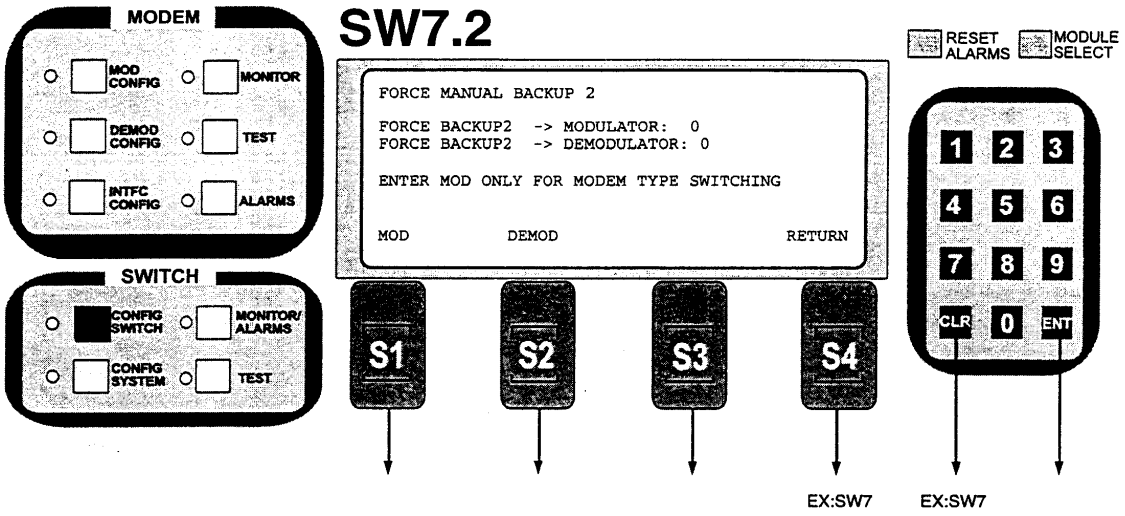
Programming steps:
1. Press SET BU1 to switch prime channels to backup channel 1.
2. Press SET BU2 to switch prime channels to backup channel 2.
3. Note that SET BU2 will be unavailable if channel 9 is configured as a prime channel.



Notes:

This screen allows switching prime channels to backup channel 1 manually. Backup channel 1 must be in manual mode to force prime channels into backup. If a prime channel is configured for linked switching, then switching the prime channel modulator only will also switch the demodulator.

Programming steps:
1. Press MOD or DEMOD to move the flashing cursor to the modulator or demodulator selection.
2. Use the numeric keypad to enter the prime channel number to switch to backup channel 1.
3. Press CLR or NEXT to abort programming (no switch parameters will be changed).
4. Press ENT to load the information on the screen into the switch parameter table. Switching will occur immediately after pressing ENT.



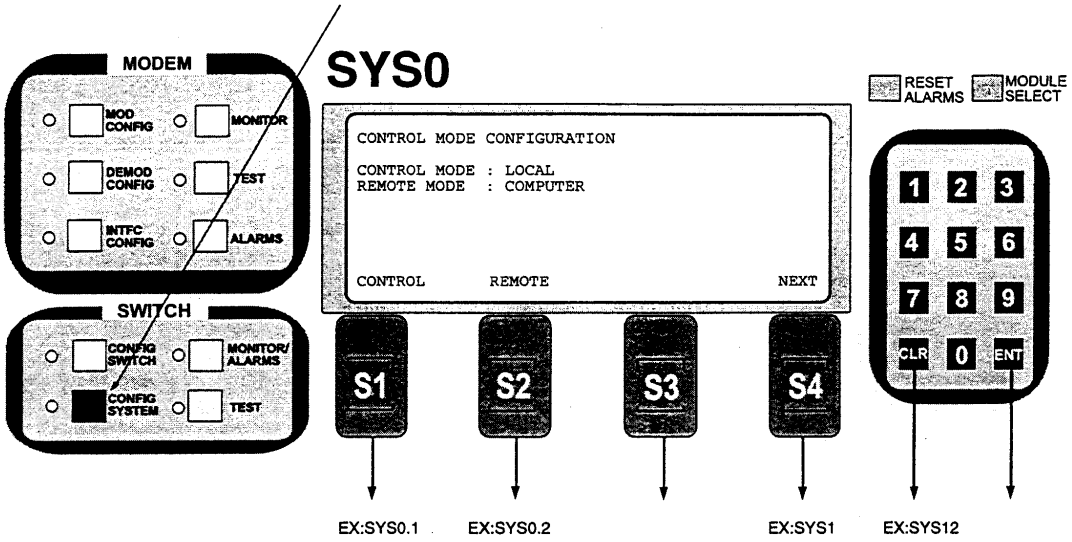
Notes:

This screen allows switching prime channels to backup channel 2 manually. Channel 9 must be configured as backup channel 2, and backup channel 2 must be in manual mode to force prime channels into backup. If a prime channel is configured for linked switching, then switching the prime channel modulator only will also switch the demodulator.

Programming steps:
1. Press MOD or DEMOD to move the flashing cursor to the modulator or demodulator selection.
2. Use the numeric keypad to enter the prime channel number to switch to backup channel 2.
3. Press CLR or NEXT to abort programming (no switch parameters will be changed).
4. Press ENT to load the information on the screen into the switch parameter table.
   Switching will occur immediately after pressing ENT.

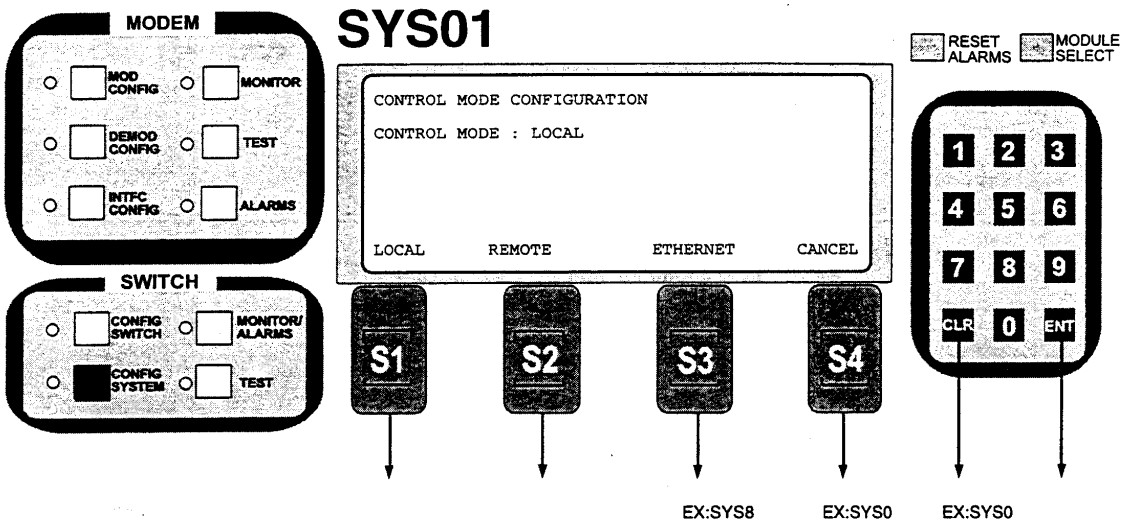
3.16 RCS10 Switch Section, System Configuration Screens

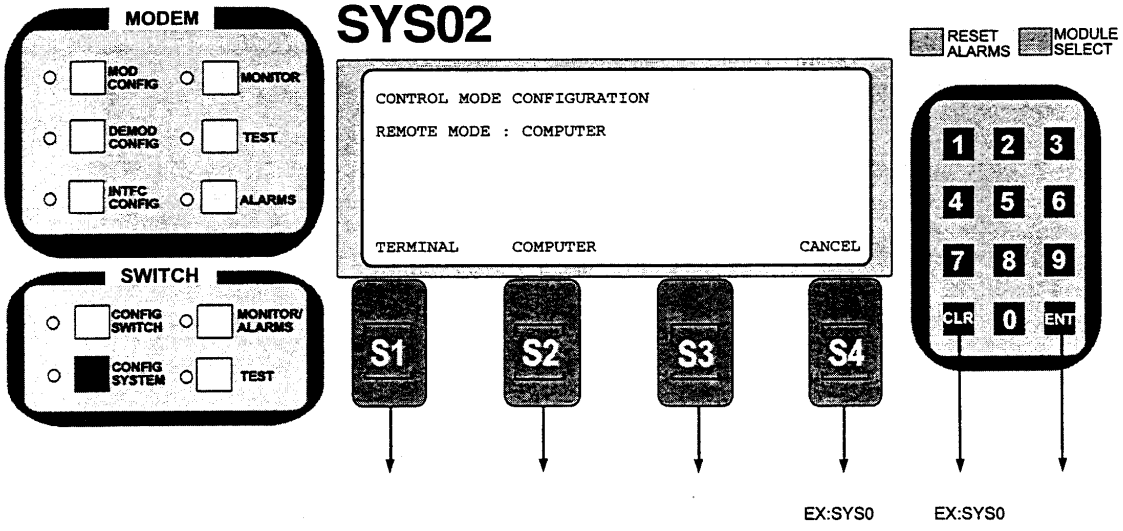
The following Operation Screens are accessible by depressing the CONFIG SYSTEM button located on the bottom left of the RCS10 front panel.

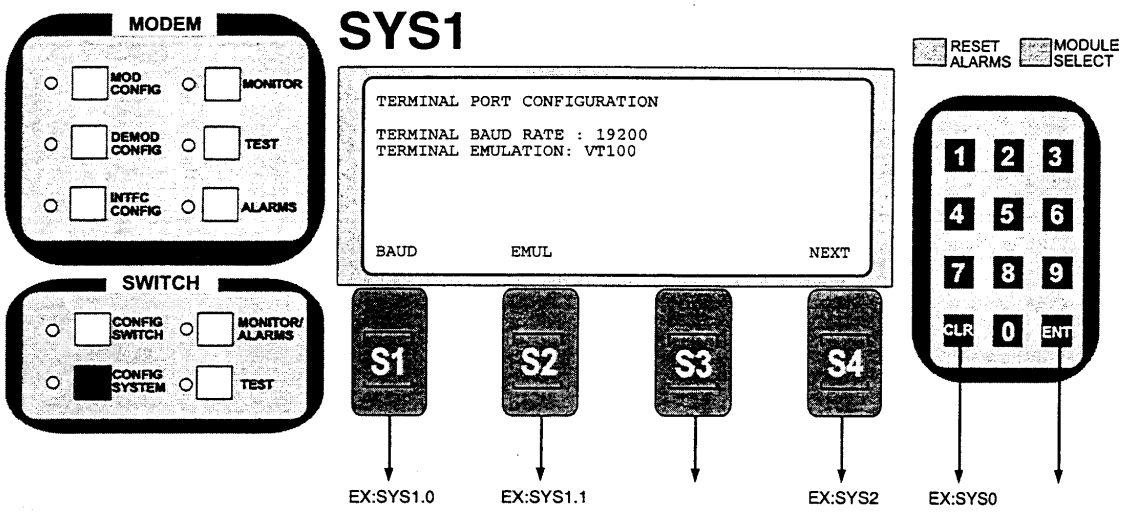


Notes:
This screen allows selection of the RCS10 control mode. The control mode can be LOCAL, REMOTE or ETHERNET (See SYS01). When in Front Panel mode, commands will only be accepted from the front panel and keypad. When in Terminal mode, commands will only be accepted through the RS-232 terminal connection. When in Computer mode, commands will only be accepted from the RS-485 remote port connection.

Programming steps:
1. Press LOCAL, REMOTE or ETHERNET (SYS01) to select the desired control mode. The mode will be selected immediately after pressing the appropriate key.
2. Press CLR or NEXT to abort programming (no switch parameters will be changed).

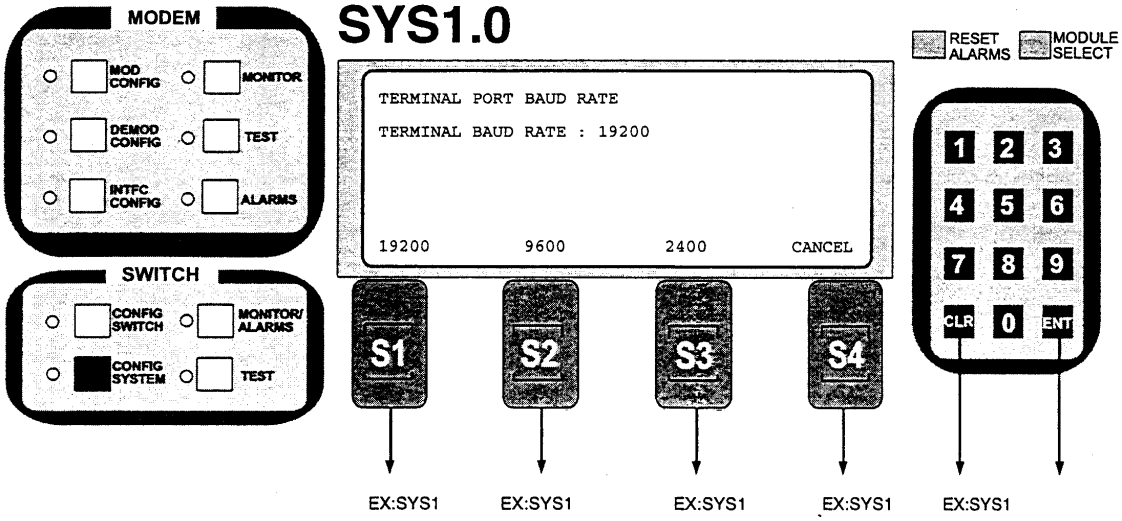

SYS01
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
CONTROL MODE CONFIGURATION
CONTROL MODE : LOCAL
LOCAL
REMOTE
ETHERNET
CANCEL
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS8
EX:SYS0
EX:SYS0

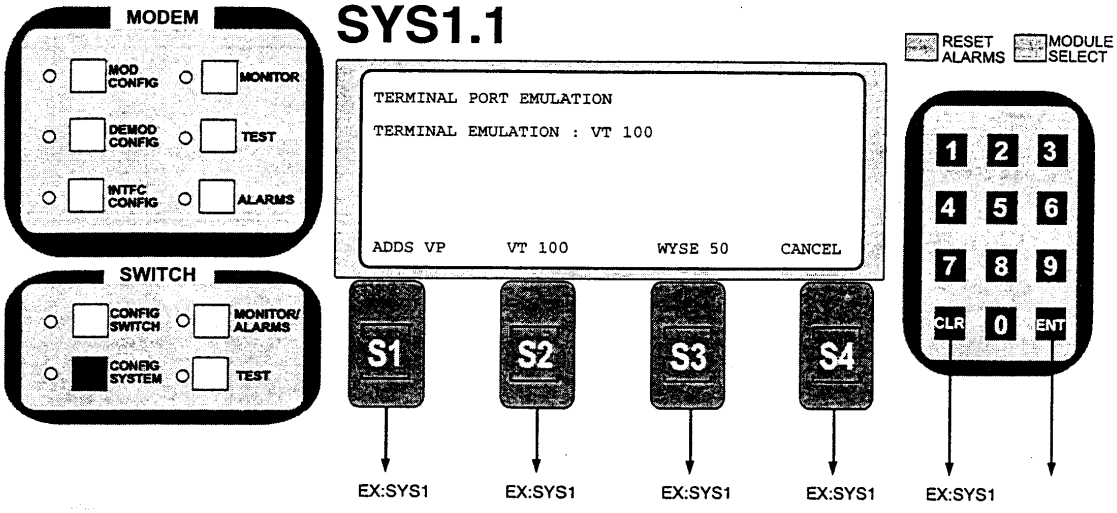

SYS02
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
CONTROL MODE CONFIGURATION
REMOTE MODE : COMPUTER
TERMINAL
COMPUTER
CANCEL
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS0
EX:SYS0



Notes:
This screen allows control of the RCS10 terminal port. The terminal port baud rate and terminal emulation can be configured. Note that after changing the terminal port baud rate, a power cycle is necessary before the new baud rate takes effect.

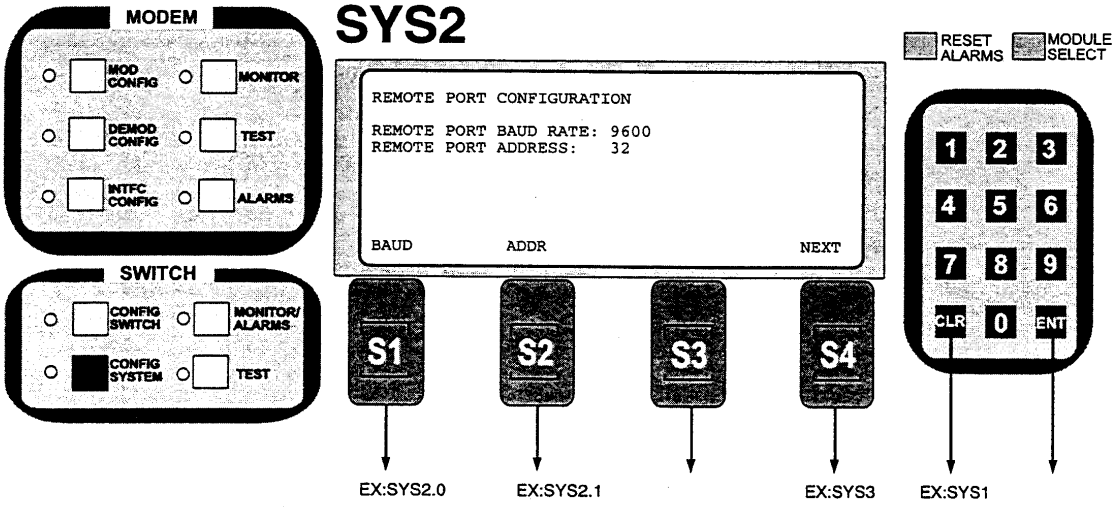
Programming steps:
1. Press BAUD to configure the terminal port baud rate. Press EMUL to configure the terminal port terminal emulation.



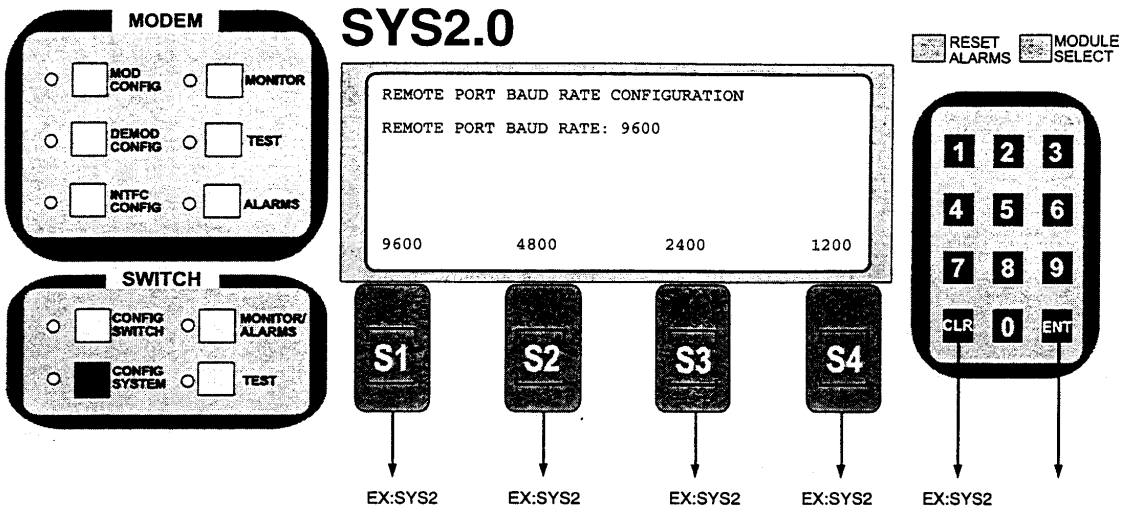


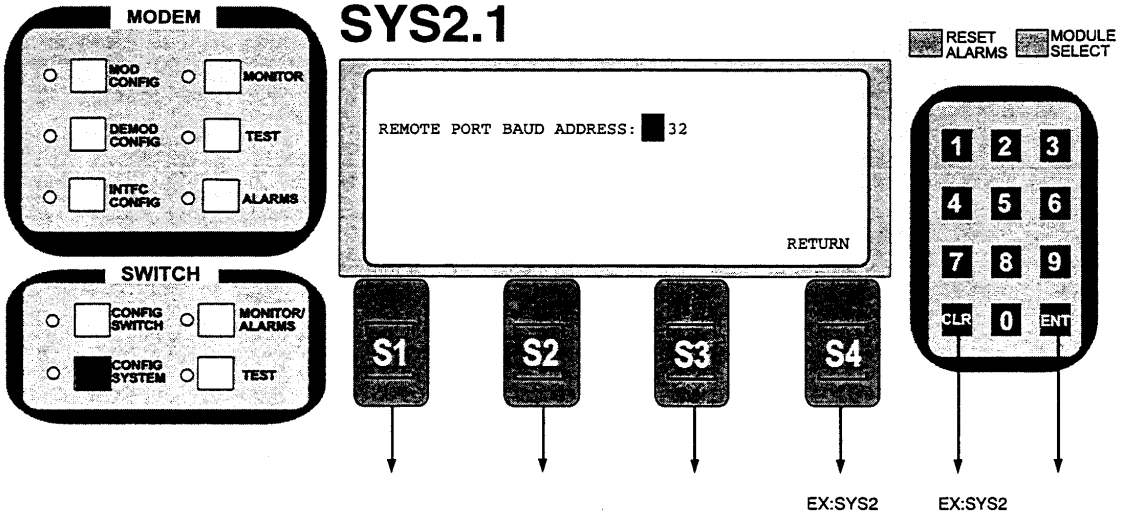
Notes:
This screen allows control of the RCS10 terminal port terminal emulation.
Programming steps:

1. Press ADDS VP, VT 100, or WYSE 50 to select the desired Terminal Emulation. The switch parameter table will be updated immediately.
2. Press CLR or NEXT to abort programming (no switch parameters will be changed).

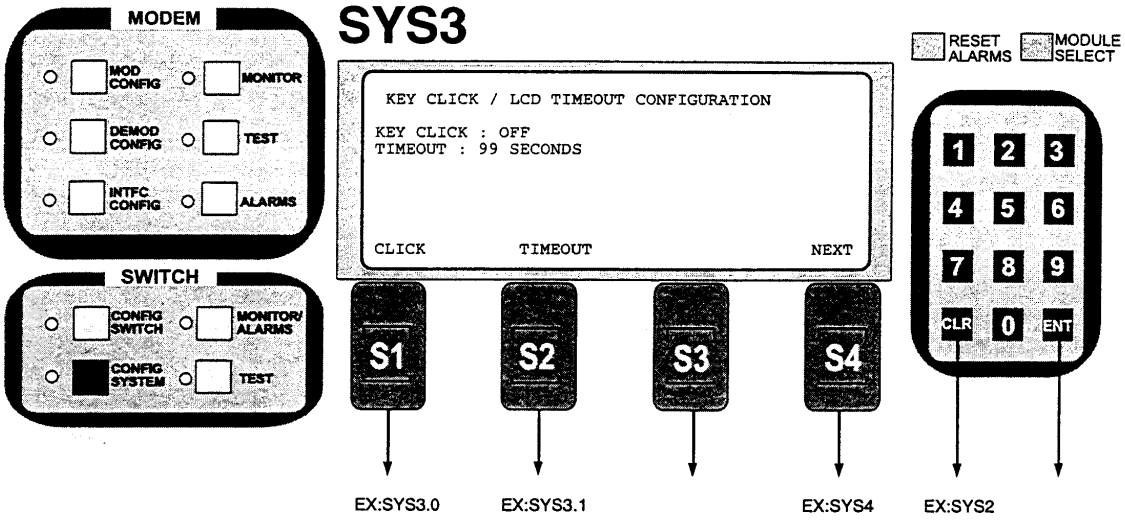


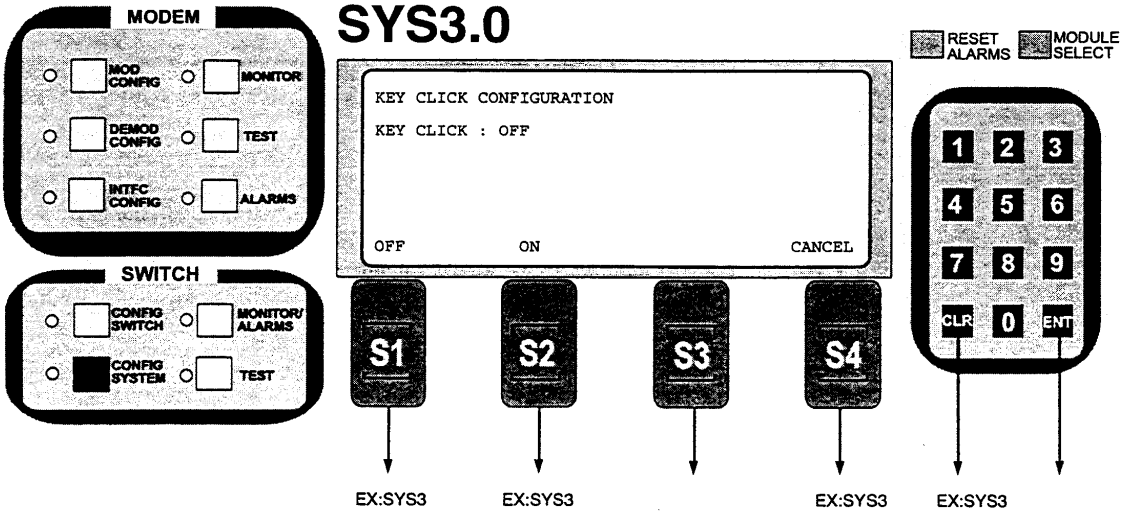
Notes:
This screen allows control of the RCS20 Remote Port Configuration, including the Baud rates and Address.

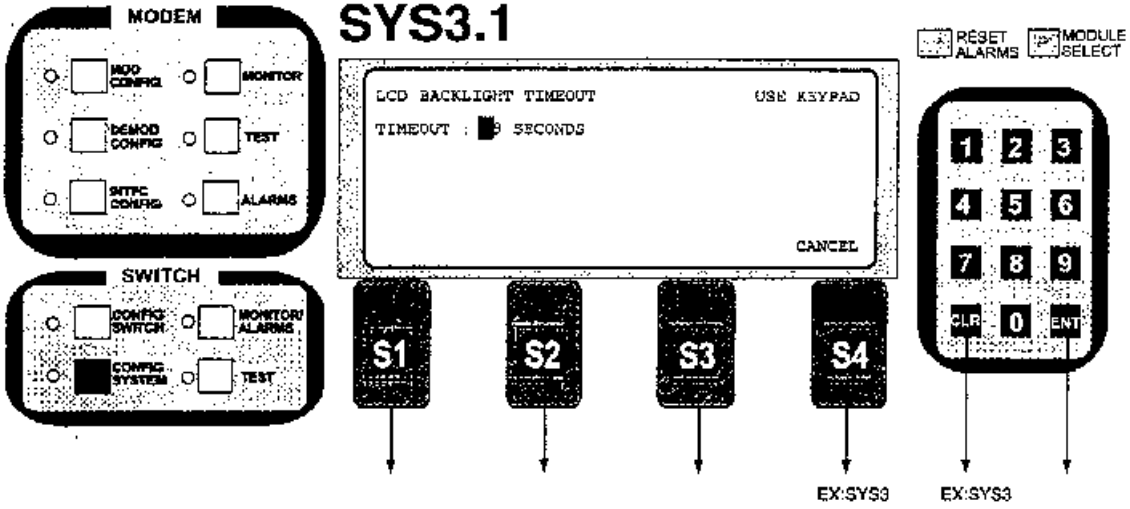




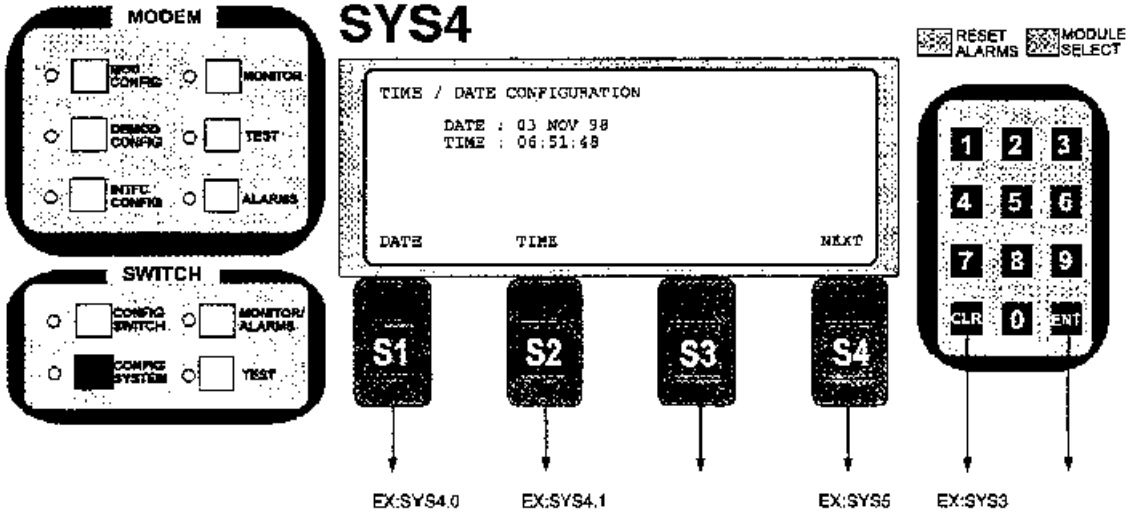
Note: Use Keypad to make selection, then press the Enter key.

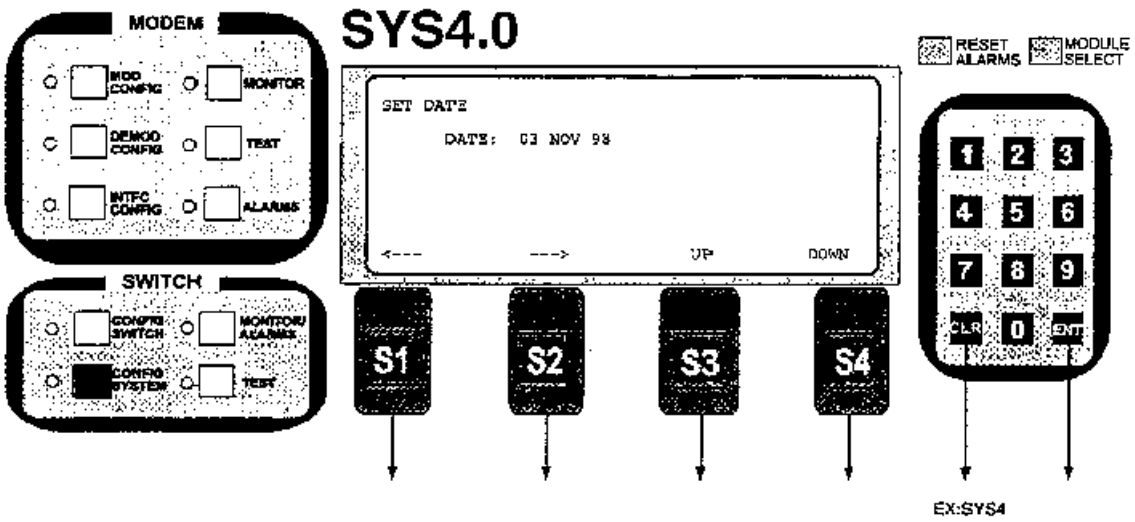

SYS3
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
KEY CLICK / LCD TIMEOUT CONFIGURATION
KEY CLICK : OFF
TIMEOUT : 99 SECONDS
CLICK
TIMEOUT
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS3.0
EX:SYS3.1
EX:SYS4
EX:SYS2

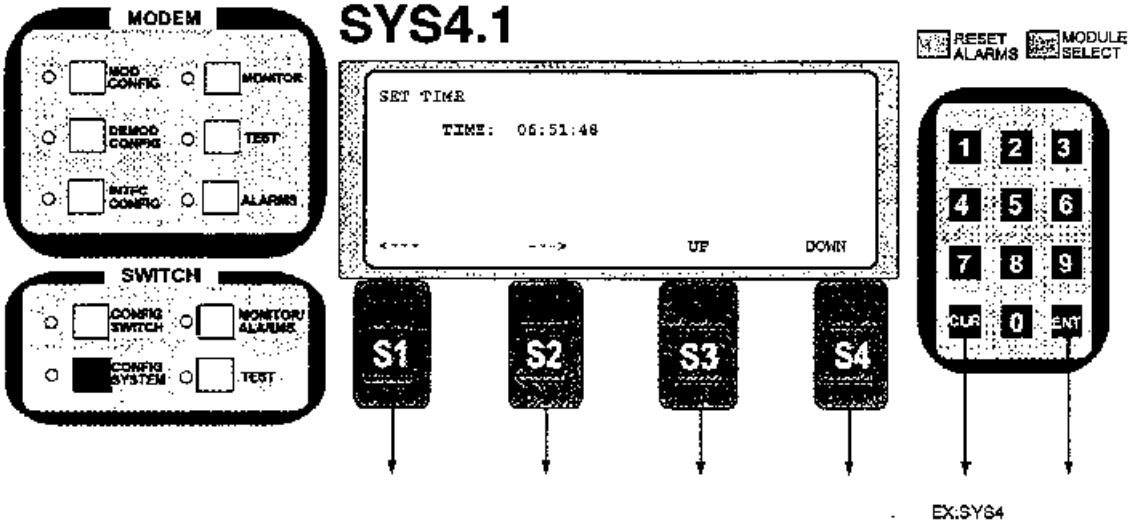

SYS3.0
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
KEY CLICK CONFIGURATION
KEY CLICK : OFF
OFF
ON
CANCEL
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS3
EX:SYS3
EX:SYS3
EX:SYS3

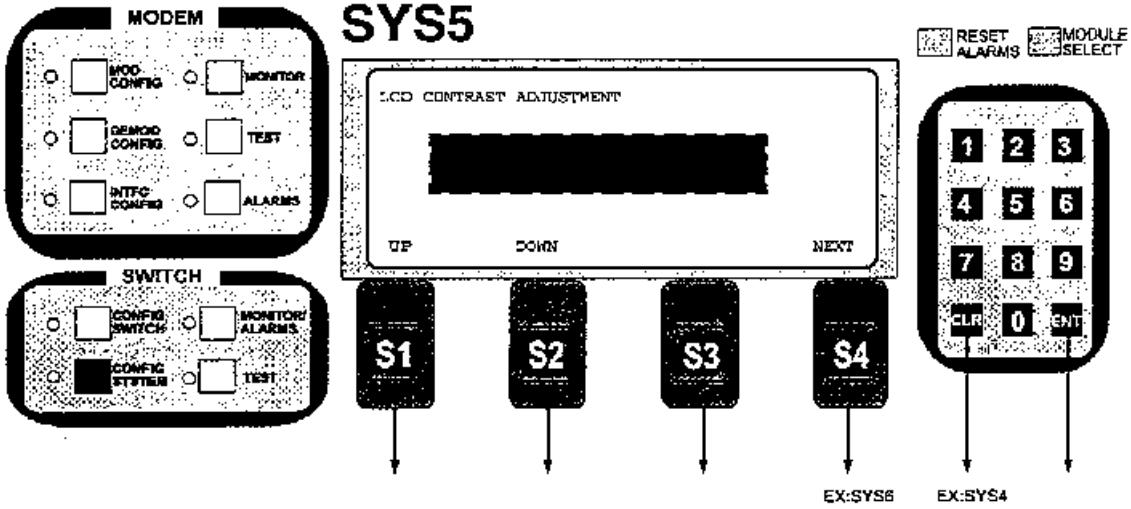


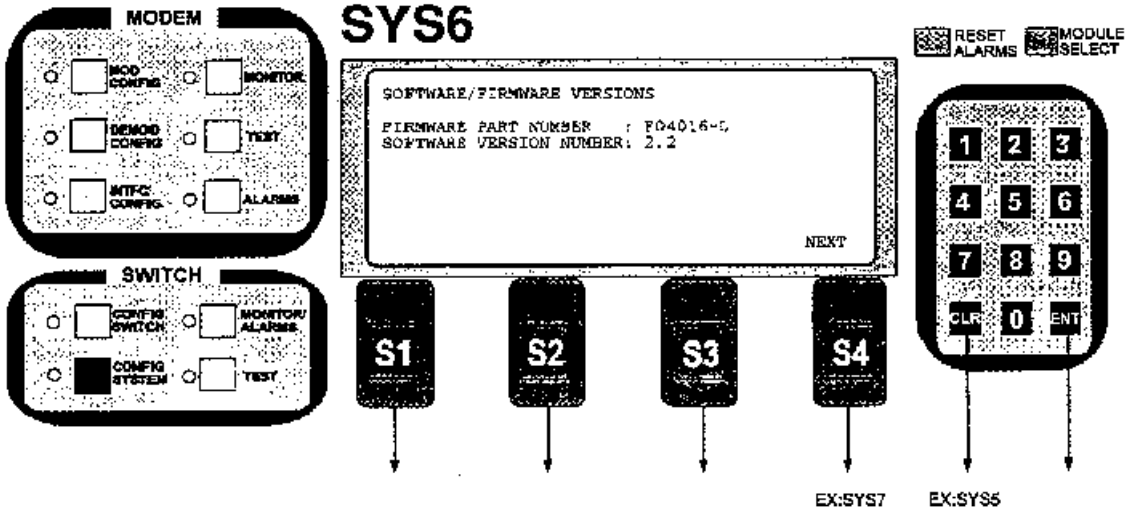
Note: Use Keypad to make selection, then press Enter key.

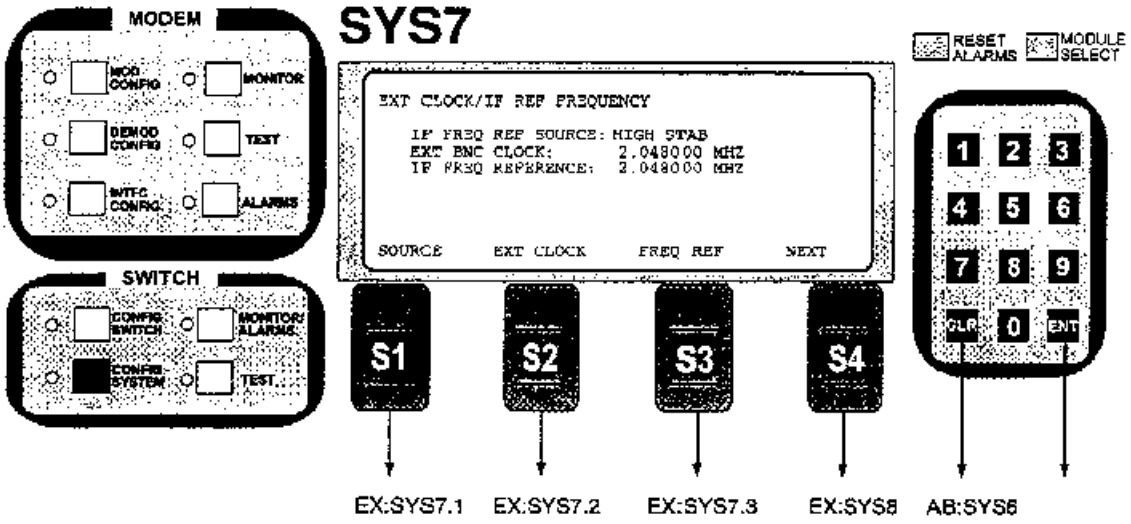


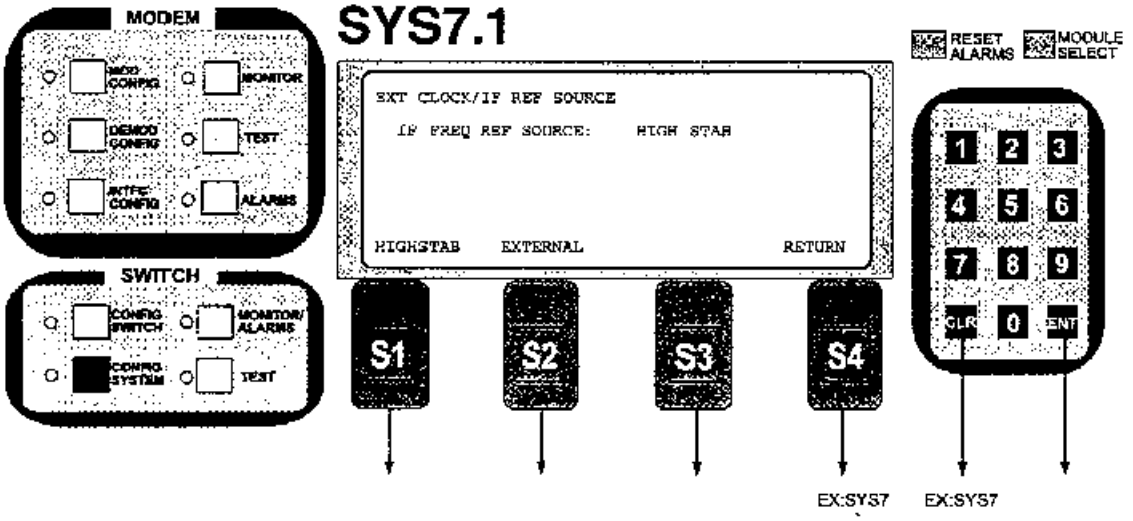

SYS4.0
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
SET DATE
DATE: 03 NOV 98
<---
--->
UP
DOWN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS4

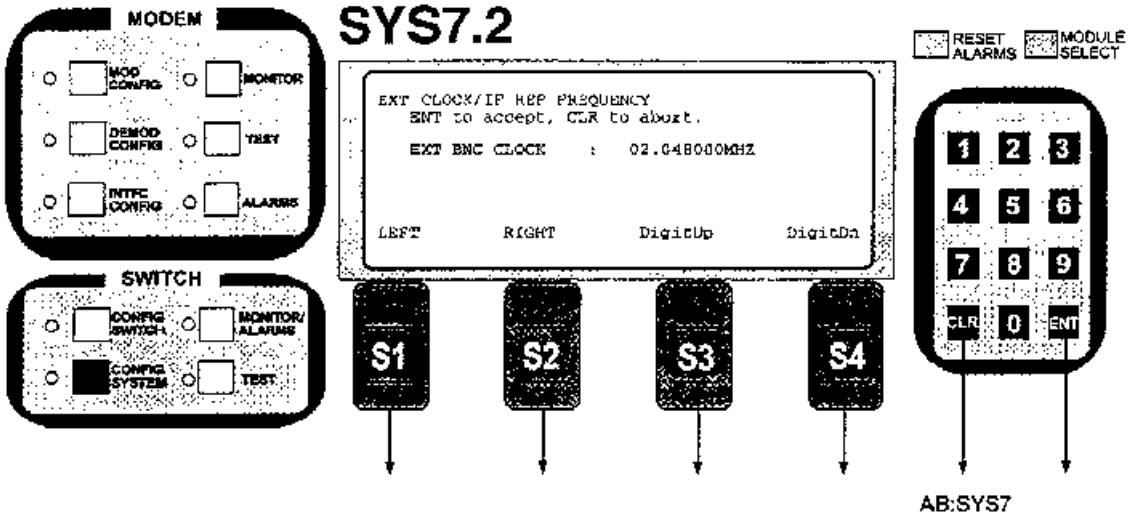

SYS4.1
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
SET TIME
TIME: 06:51:48
<---
--->
UP
DOWN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS4

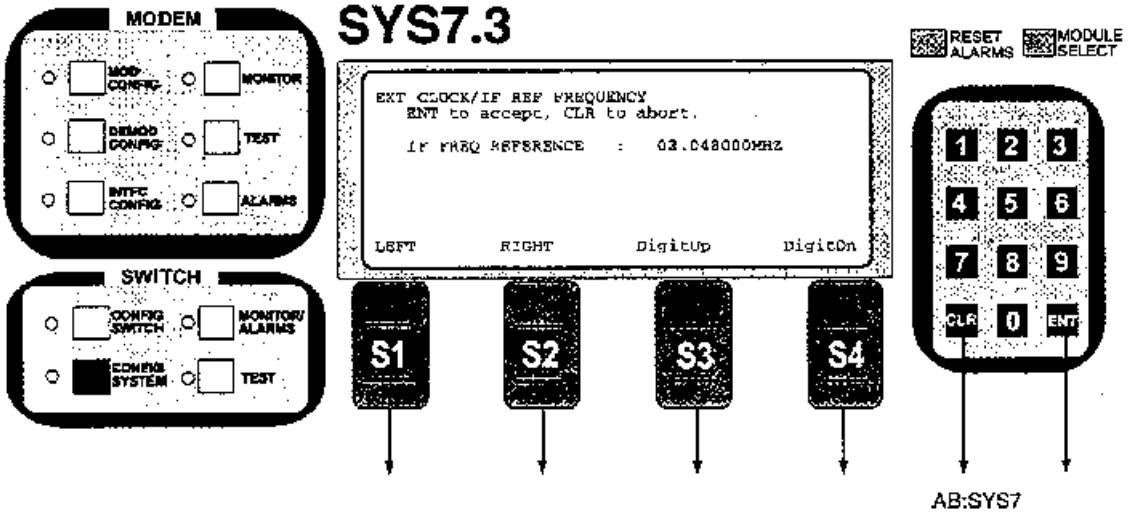

SYS5
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
LCD CONTRAST ADJUSTMENT
UP
DOWN
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS6
EX:SYS4

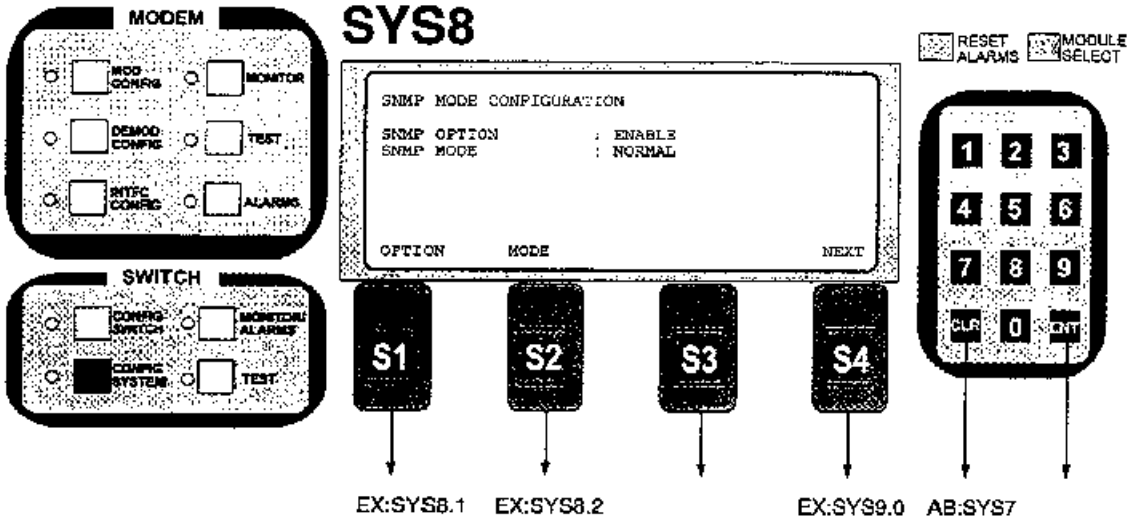

SYS6
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
SOFTWARE/FIRMWARE VERSIONS
FIRMWARE PART NUMBER : F04016-C
SOFTWARE VERSION NUMBER: 2.2
NEXT
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
EX:SYS7
EX:SYS5


MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
SYS7
EXT CLOCK/IF REF FREQUENCY
IF FREQ REF SOURCE: HIGH STAB
EXT BNC CLOCK: 2.048000 MHZ
IF FREQ REFERENCE: 2.048000 MHZ
SOURCE
EXT CLOCK
FREQ REF
NEXT
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
S1
S2
S3
S4
EX:SYS7.1
EX:SYS7.2
EX:SYS7.3
EX:SYS8
AB:SYS8

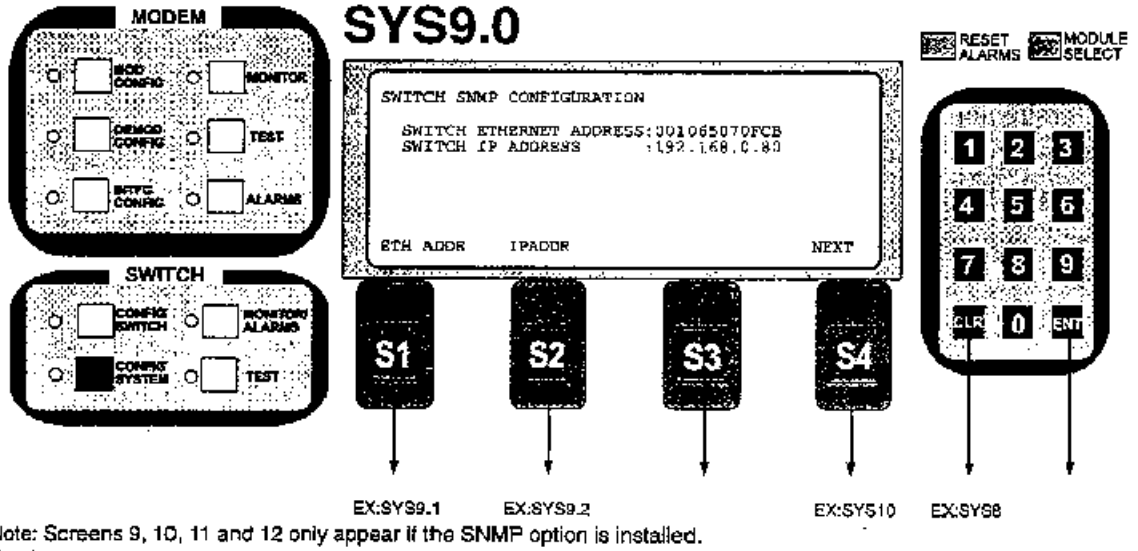

MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
SYS7.1
EXT CLOCK/IF REF SOURCE
IF FREQ REF SOURCE: HIGH STAB
HIGHSTAB
EXTERNAL
RETURN
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
S1
S2
S3
S4
EX:SYS7
EX:SYS7


SYS7.2
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
EXT CLOCK/IF REF FREQUENCY
ENT to accept, CLR to abort.
EXT BNC CLOCK : 02.048000MHZ
LEFT
RIGHT
DigitUp
DigitDn
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
AB:SYS7

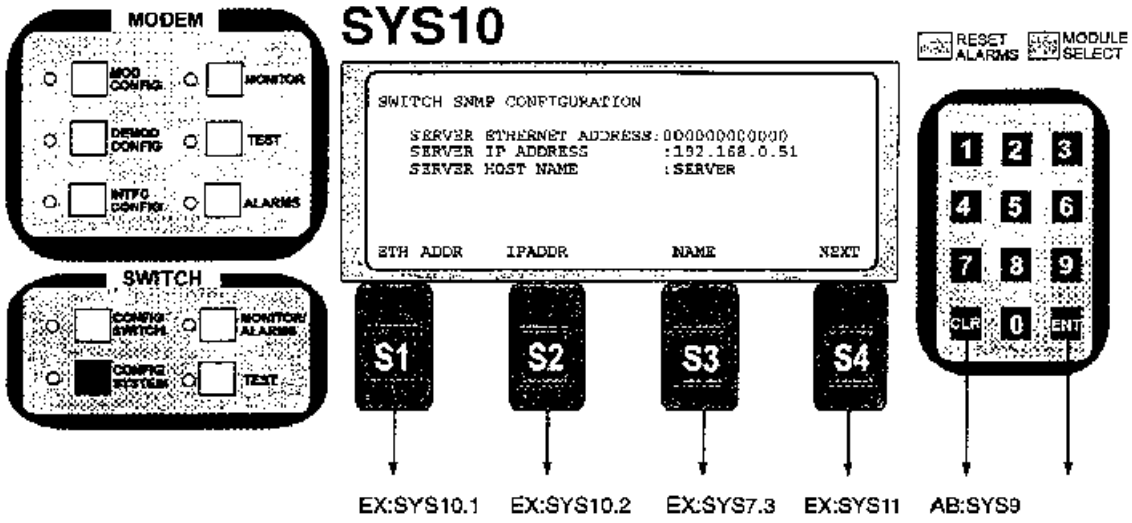

SYS7.3
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
EXT CLOCK/IF REF FREQUENCY
ENT to accept, CLR to abort.
IF FREQ REFERENCE : 03.048000MHZ
LEFT
RIGHT
DigitUp
DigitDn
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
AB:SYS7



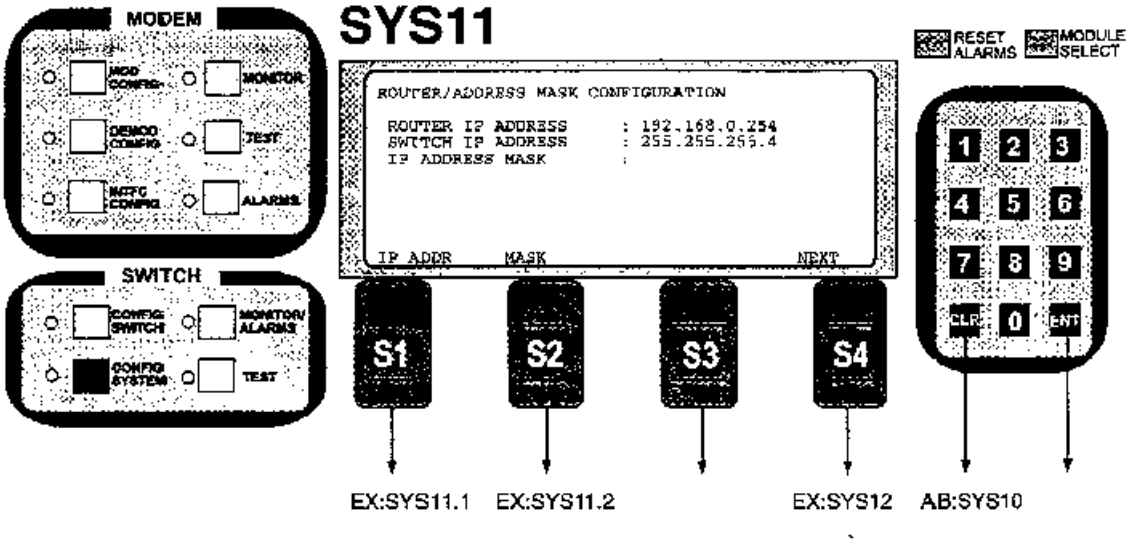
Note: If the SNMP option is not installed, depressing S1 or S2 will take the user to a screen that says "This selection is not allowed with the current software configuration."



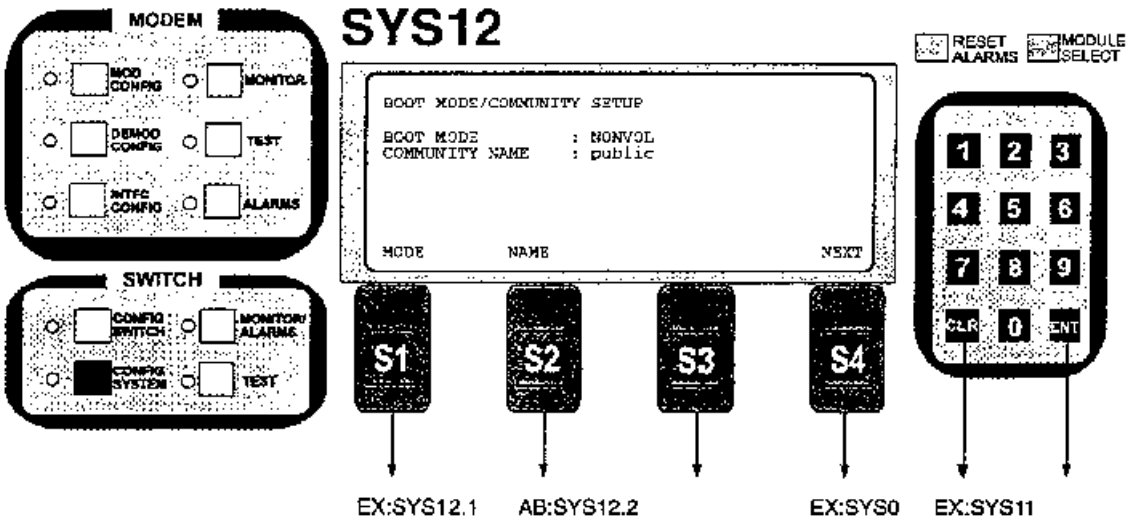
Note: Screens 9, 10, 11 and 12 only appear if the SNMP option is installed.
The first three bytes of the Ethernet address (00 10 65) are the Radyne Vendor Address Component. The last three bytes carry the product serial number. The first byte of the IP Address indicates the class. It can be used to see which bits are network bits and which bits are locally administered. Local bits can identify interfaces on a network. These can be used to make more manageable pieces called subnets. The IP address will then consist of a network, subnet and host fields.



Note: The SERVER Ethernet address need not be specified. Address resolution is used to find the hardware address of the target host when the IP address is known. The server host name is the name of the target host.



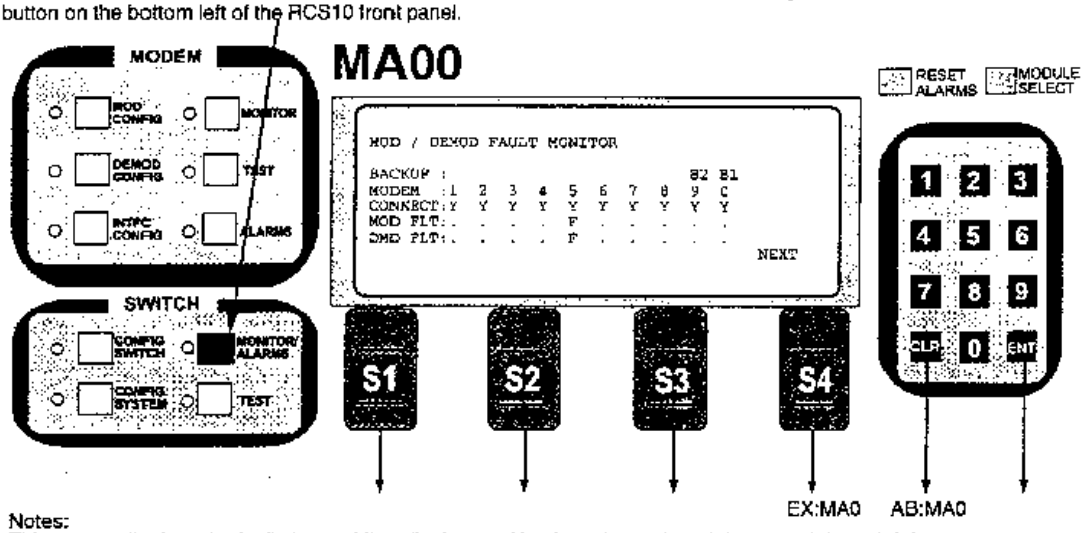
Note: The IP Address mask identifies which bits are network bits, subnet bits, and interface bits. The mask has the same number of bits as the IP address.



Note: The RCS10L has three Boot Modes. DEFAULT, NONVOL and BOOT P. Setting the Boot Mode to DEFAULT resets the TCP/IP parameters to default settings. The NONVOL setting makes use of the last configuration stored stored in non-volatile memory. When the Boot Mode is set to Boot P, the RCS10L uses Bootstrap Protocol to get its default router, its own IP address, the Boot P server's IP address and the address mask. The community name is used by the RCS10L as a clear text password to authenticate access to its MIB.

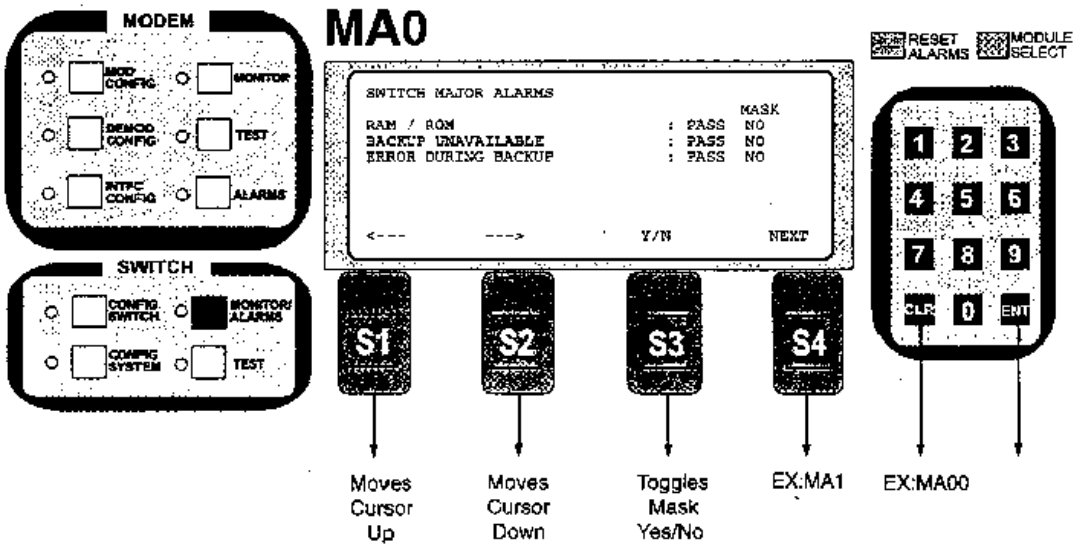
3.17 Switch Monitor/Alarms

The following RCS10 Switch Monitor and Alarms screens are accessible by depressing the MONITOR/ALARMS button on the bottom left of the RCS10 front panel.

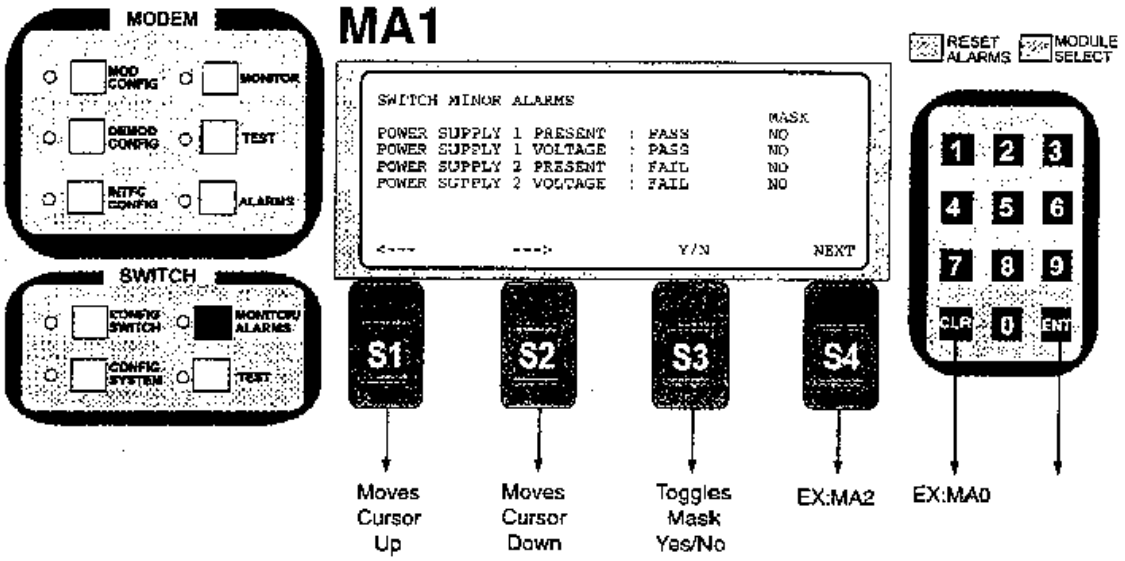


Notes:
This screen displays the fault status of the all prime and backup channel modulators and demodulators.
The screen above uses the following one letter codes:

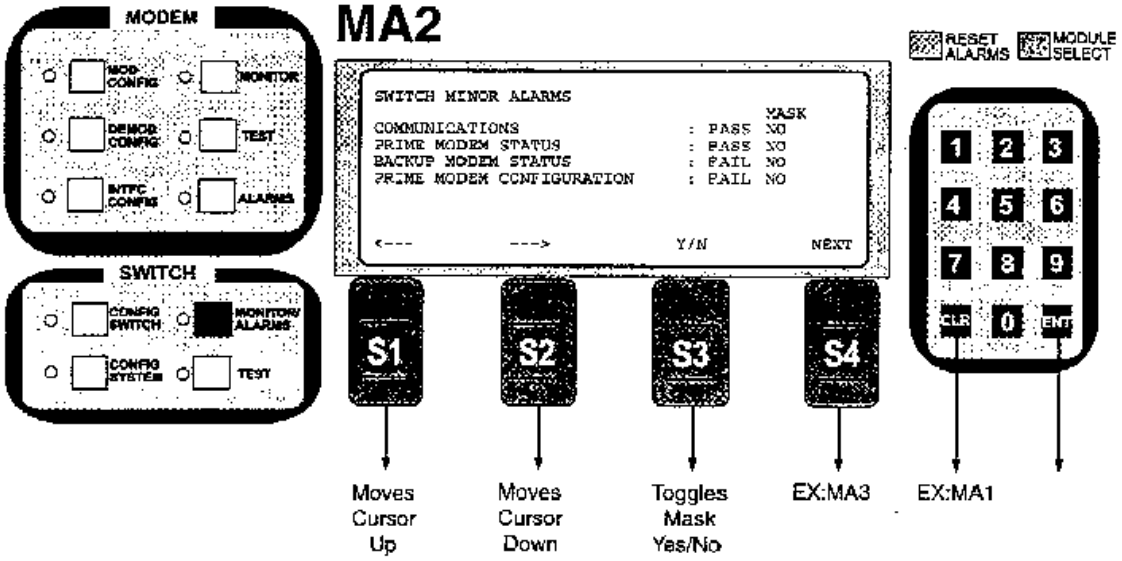
- '.' Indicates that the modulator or demodulator is reporting status normal.
- 'F' Indicates that the modulator of demodulator is reporting failure status. Note that when a channel is configured for linked switching, either a modulator fault or a demodulator fault will report both modulator and demodulator faults to the RCS10.



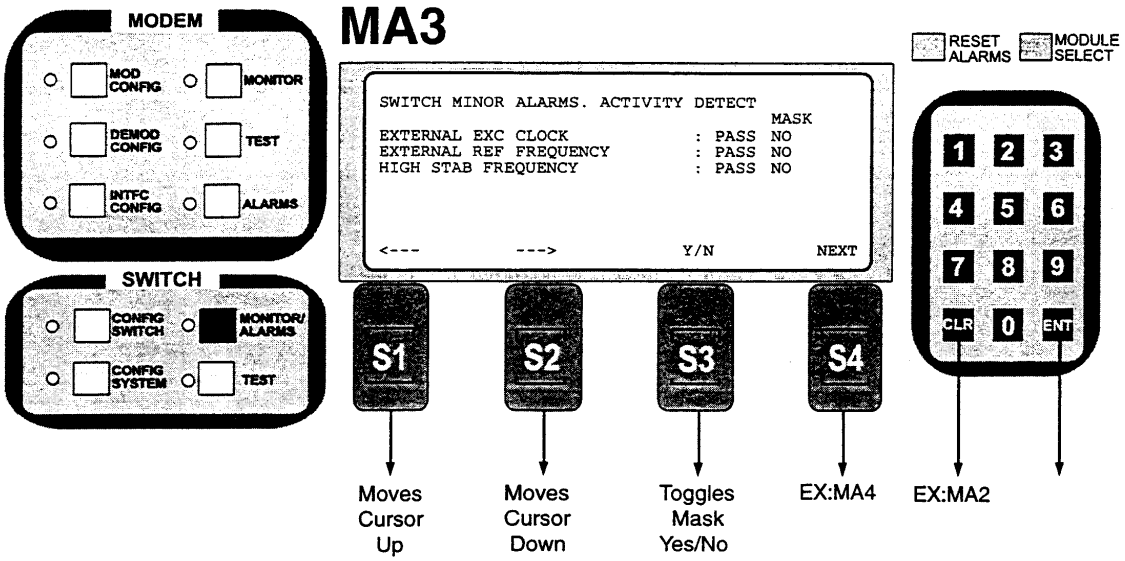
Note: Switch Major Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.



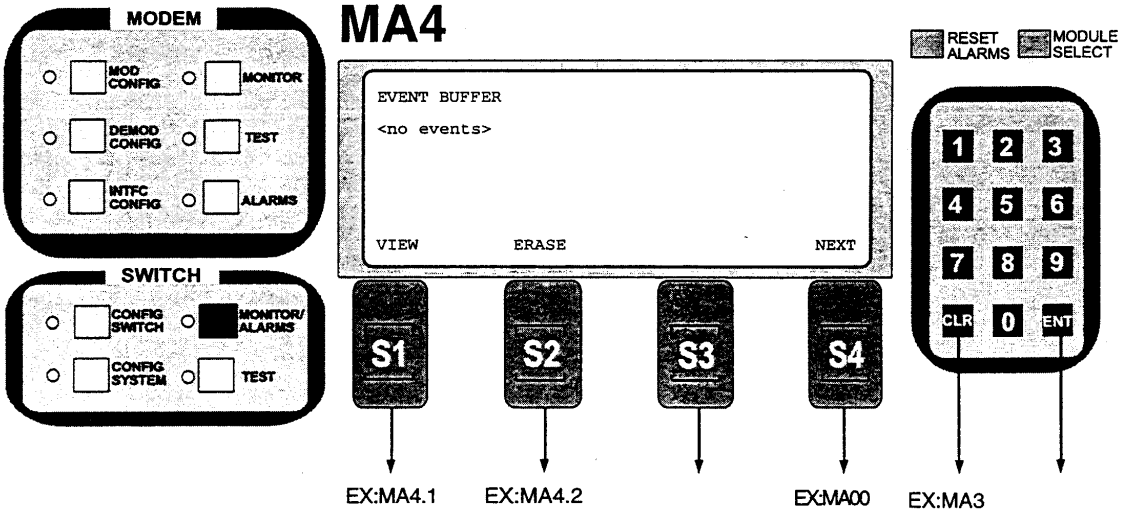
Note: Switch Major Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.

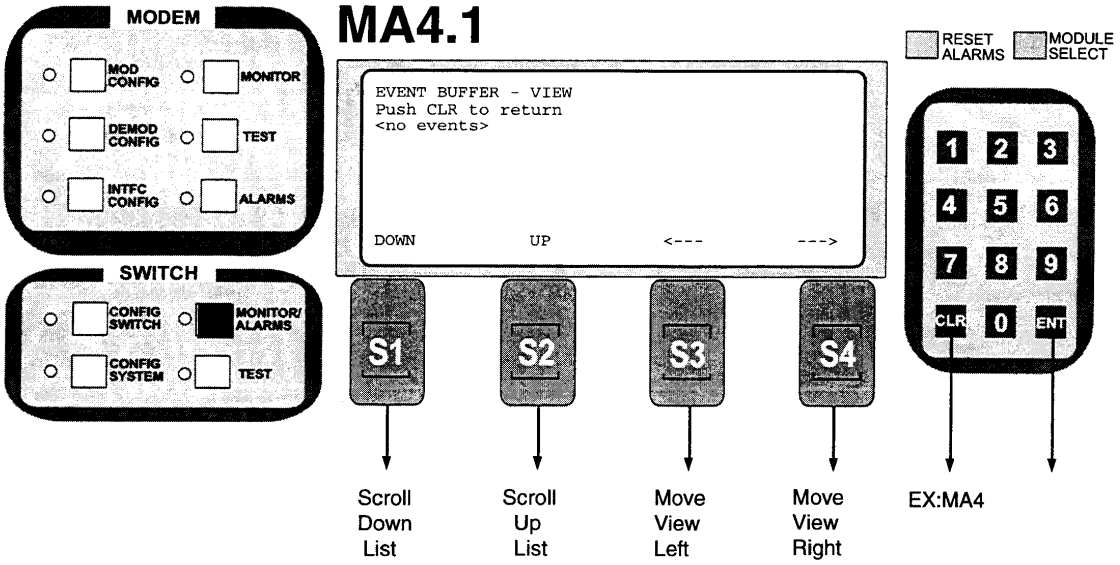


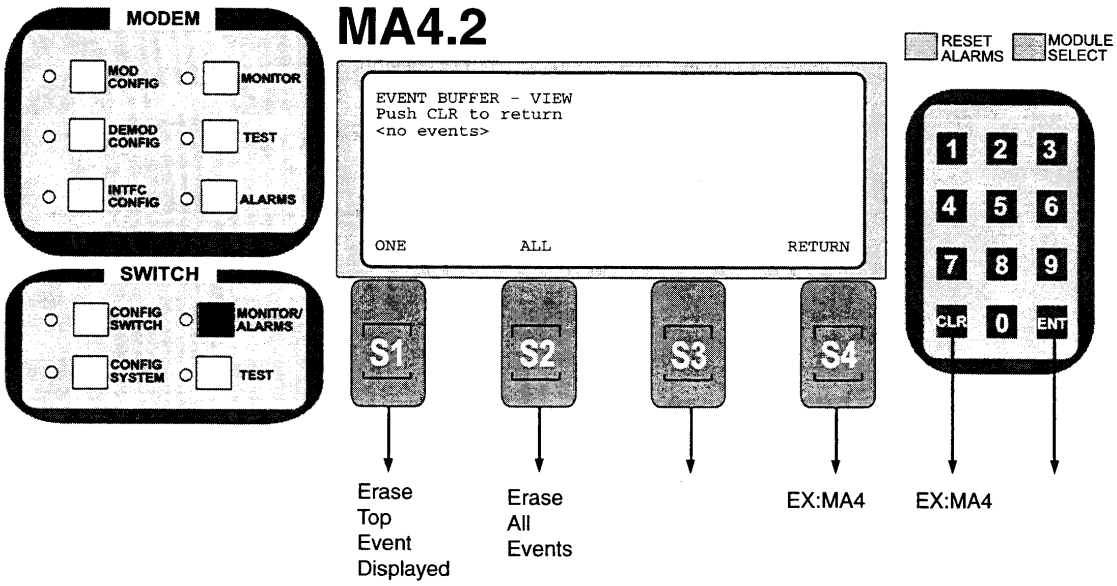
Note: Switch Major Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.



Note: Switch Minor Alarms: Selects the Alarm and selects Mask or No Mask of that alarm.

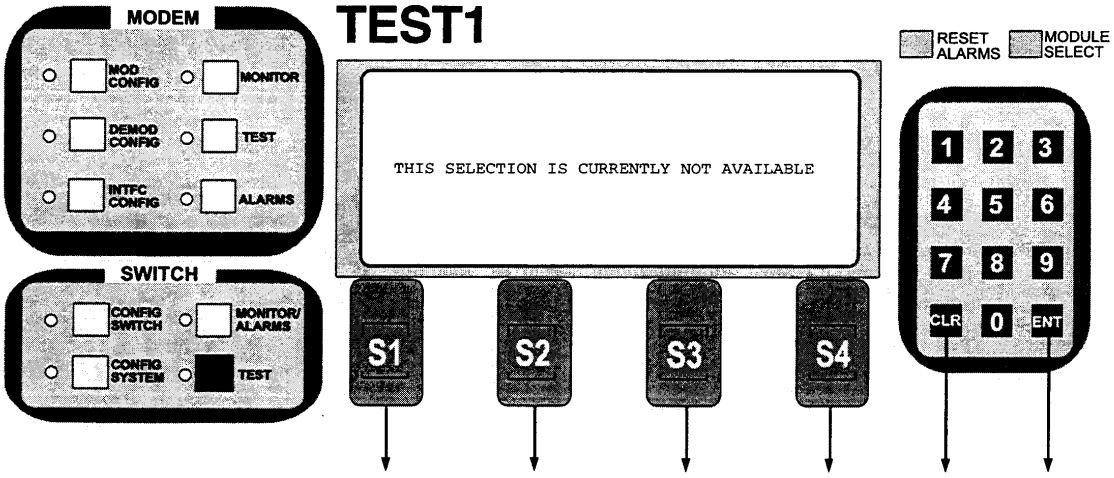



MA4.1
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
EVENT BUFFER - VIEW
Push CLR to return
<no events>
DOWN
UP
<---
--->
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
Scroll Down List
Scroll Up List
Move View Left
Move View Right
EX:MA4


MA4.2
MODEM
MOD CONFIG
MONITOR
DEMOD CONFIG
TEST
INTFC CONFIG
ALARMS
SWITCH
CONFIG SWITCH
MONITOR/ ALARMS
CONFIG SYSTEM
TEST
EVENT BUFFER - VIEW
Push CLR to return
<no events>
ONE
ALL
RETURN
S1
S2
S3
S4
RESET ALARMS
MODULE SELECT
1 2 3
4 5 6
7 8 9
CLR 0 ENT
Erase Top Event Displayed
Erase All Events
EX:MA4
EX:MA4

3.18 Switch Test

The Switch Test function is currently not available. The screen below is displayed when the TEST button on the lower left of the RCS10 front panel is depressed.



Section 4 - Basic Troubleshooting and Maintenance

4.0 Periodic Maintenance

The DMD10 Modem requires no periodic field maintenance procedures. Should a unit be suspected of a defect in field operations after all interface signals are verified, the proper procedure is to replace the unit with another known working modem. If this does not cure the problem, faulty wiring, cabling or power should be suspected.

4.1 Fuse Replacement

The RCS10 Baseband Board contains a lithium-type battery. This battery may explode if mistreated. DO NOT attempt to recharge, disassemble or dispose of in fire. Replace only with the same type recommended by the manufacturer. Dispose of lithium batteries properly.

4.1.1 Redundant Power Supply Fuse Replacement

Double-pole/neutral fusing is used. The AC power cord that is next to each fuse must be disconnected before the fuse may be removed. To keep the RCS10 operational, be sure to disconnect only one power cord at a time. Also, be sure to replace the fuse and the power cord before checking the other fuse.

The AC fuses are located under the fuse cover next to each AC power plug. To remove a fuse, the power cord must first be unplugged so that the cover can be slid away from the fuse and over the AC receptacle. The fuse may now be removed for testing. Test the fuse with an ohmmeter or similar device. If necessary, replace the fuse with a new 6.3 A, 250 V fuse. Be sure to replace the fuse with one of the same type and rating. Failure to do so may result in damage to the equipment and may result in a fire hazard.

4.2 Troubleshooting

The following is a brief list of possible problems that could be caused by failures of the modem or improper setup and configuration for the type of service. The list is arranged by possible symptoms exhibited by the modem.

Symptom: The Modem will not acquire the incoming carrier:

Possible Cause: Improper receive input to modem.

> ***Action****:* Check that the receive cabling is correct.
>
> Possible Cause: Receive carrier level too low.
>
> ***Action*****:** Check that the receive cabling is correct, that the downconverter is properly set and that the LNA is turned on. If a spectrum analyzer is available, locate and measure the receive level, which should not be below –55 dBm absolute.
>
> Possible Cause: Receive carrier frequency outside of acquisition range.

***Action*:** Check that the receive acquisition range is adequate for the possible system offsets. Setting the value to 30 KHz is a standard value encompassing all normal offsets. After acquisition, the actual receive frequency can be read from the front panel.

Possible Cause: Transmit carrier incompatible.

***Action**:* Check the receive parameter settings and ensure that they match those on the modulator.

Possible Cause: Modem is in test mode.

***Action**:* Check the modem front panel for yellow warning LEDs indicating a test mode is enabled. Self-Test or RF Loopback disconnects the Demodulator from the IF receive input connector.

4.2.1 DMD10 Fault Philosophy

The DMD10 performs a high degree of self-monitoring and fault isolation. The alarms are separated into five categories; Major Alarms, Minor Alarms, Common Alarms, Backward Alarms and Latched Alarms. Also, a feature exists that allows the user to 'Mask' out certain Alarms as explained below.

4.2.2 Alarm Masks

The user has the capability to 'Mask' individual alarms on the DMD10. When an Alarm is masked, the front panel LEDs and the Fault Relays do not get asserted, but the Alarm will still be displayed. This feature is very helpful during debugging or to lock out a failure that the user is already aware of.

4.2.3 Major Alarms

Major alarms indicate a modem hardware failure. Major alarms may flash briefly during modem configuration changes and during power up but should not stay illuminated.

Alarms are grouped into Transmit Alarms and Receive Alarms - Transmit and Receive are completely independent.

4.2.4 Minor Alarms

Minor alarms indicate that a problem may persist outside the modem such as loss of terrestrial clock, loss of terrestrial data activity, or a detected transmit or receive AIS condition.

Alarms are grouped into Transmit Alarms and Receive Alarms - Transmit and Receive are completely independent.

4.2.5 Common Alarms

Common alarms may be Major or Minor and are defined as alarms that cannot be classified as strictly transmit or receive. These alarms are common to both.

4.2.6 Backward Alarms

Backward alarms are alarms that are fed back to or received from the other end of the satellite link.

4.2.7 Latched Alarms

Latched alarms are used to catch intermittent failures. If a fault occurs, the fault indication will be latched even if the alarm goes away. After the modem is configured and running, it is recommended that the latched alarms be cleared as a final step.

4.3 DMD10 Fault Tree Matrices

Tables 4-1 through 4-4 represent, in matrix form, the faults that may occur within the DMD10 modem. There are four matrices; Backward alarms, TX Faults, RX Faults and Interface/Common Equipment Faults.

4.3.1 Interpreting the Fault Matrices

The first vertical column in the Tables represents the various Faults that the modem may identify. The top horizontal column indicates the various actions that the modem will undertake. These actions may be in the form of a relay, a switch or an LED.

RX FAULTS	TX IF OUTPUT OFF	X MINOR ALARM LED	TX MAJOR ALARM LED	TX AIS	RX MINOR ALARM LED	RX MAJOR ALARM LED	RX AIS	MOD FAULT RELAY	DEMOD FAULT RELAY	COM EQUIP FAULT RELAY	SW COM EQUIP FAULT RELAY	IBS BACKWARD ALARM	BYPASS BUFFER	CENTER BUFFER DDS	SIGNAL LOCK LED	TX BACKWARD ALARM	TX ON LED	FAULT LED	MOD FAULT OPEN COLLECTOR	DEMOD FAULT OPEN COLLECTOR	SW TX CLK TO BACK-UP	
CARRIER UNDETECTED					x		x					x								x		
RX IF SYNTH UNLOCKED						x	x		x			x								x		
RX OVRSMPL PLL UNLOCKED						x	x		x			x								x		
RX DATA AIS RCVD.					x		x					x										
RX AGC LEVEL LOW					x		x					x								x		
DEMUX UNLOCKED					x		x		x			x								x		
VITERBI UNLOCKED					x		x													x		
SEQ UNLOCKS					x		x													x		Conditional When Sequential Is Used
BER THRESHOLD REACHED					x		x					x										
BUFFER OVERFLOWS					x																	
BUFFER UNDERFLOWS					x																	
BUFFER PLL UNLOCKS					x	x	x		x											x		
FRAME SYNC LOSS						x	x		x											x		
MULTI-FRAME SYNC LOSS						x	x		x											x		
RX IDR PLL UNLOCKED						x	x		x											x		

BACKWARD ALARMS	TX IF OUTPUT OFF	TX MINOR ALARM LED	TX MAJOR ALARM LED	TX AIS	RX FAULT LED	RX MINOR ALARM LED	RX MAJOR ALARM LED	RX AIS	MOD FAULT RELAY	DEMOD FAULT RELAY	COM EQUIP FAULT RELAY	SW COM EQUIP FAULT RELAY	MINOR ALARM RELAY	IBS BACKWARD ALARM	SIGNAL LOCK LED	TX BACKWARD ALARM	TX ON LED	FAULT LED
TX BACKWARD ALARM 1		x											x					
TX BACKWARD ALARM 2		x											x					
TX BACKWARD ALARM 3		x											x					
TX BACKWARD ALARM 4		x											x					
RX BACKWARD ALARM 1						x							x					
RX BACKWARD ALARM 2						x							x					
RX BACKWARD ALARM 3						x							x					
RX BACKWARD ALARM 4						x							x					

INTERFACE/COMMON EQUIPMENT FAULTS	TX IF OUTPUT OFF	TX MINOR ALARM LED	TX MAJOR ALARM LED	TX AIS	RX FAULT LED	RX MINOR ALARM LED	RX MAJOR ALARM LED	RX AIS	MOD FAULT RELAY	DEMOD FAULT RELAY	COM EQUIP FAULT RELAY	SW COM EQUIP FAULT RELAY	MINOR ALARM RELAY	IBS BACKWARD ALARM	SWITCH BACK TO INTERNAL	SIGNAL LOCK LED	TX BACKWARD ALARM	TX ON LED	FAULT LED	BOTH MOD AND DEMOD FAULT OPEN COLLECTOR	SW BUFF CLK TO BACKUP	SW TX CLK TO BACKUP	
+5V OUT OF RANGE											x								x				
+12V OUT OF RANGE											x								x				
-12V OUT OF RANGE											x								x				
TX PROC FAULT									x										x				
RX PROC FAULT										x									x				
TEMP. OUT OF RANGE											x								x				
NO EXT IF REF ACTIVITY		x																	x				
EXT IF REF PLL UNLOCK			x						x						x								
NO EXT BNC CLK ACT		x				x							x		x				x		x	x	Conditional When in Use
UIO NOT PRESENT		x				x													x				Conditional When in Use
RAM/ROM FAULT											x												Conditional When in Use

*When EXT EXC is used as a reference for the Buffer Clock, and activity on the EXT EXC is lost, the modem switches Rx clock reference to SCTE if it exists, otherwise it switches to SCT. When SCT is used as a reference, and activity is lost, the modem switches Rx reference to SCT

TX FAULTS	TX IF OUTPUT OFF	TX MINOR ALARM LED	TX MAJOR ALARM LED	TX AIS	RX FAULT LED	RX MINOR ALARM LED	RX MAJOR ALARM LED	RX AIS	MOD FAULT RELAY	DEMOD FAULT RELAY	COM EQUIP FAULT RELAY	IBS BACKWARD ALARM	CENTER TX COMPOSITE CLK	SIGNAL LOCK LED	TX BACKWARD ALARM	TX ON LED	FAULT LED	MOD FAULT OPEN COLLECTOR	DEMOD FAULT OPEN COLLECTOR	SW TX CLK TO BACK-UP	SW BUFF CLK TO BACK-UP*	
TX IF SYNTH UNLOCKED	x		x						x			x	x					x				
TX CLOCK ACT		x		x										x				x			x	
TX COMP CLK PLL UNLOCKED	x		x	x					x			x	x	x				x				
TX OUTPUT LEVEL	x		x						x									x				
NO TX DATA ACTIVITY		x		x																		
TX AIS RCVD		x		x																		
DROP TERR DEFRAMER LOCK		x		x								x	x					x				Applicable in Drop and Insert Only
INSERT TERR DEFRAMER LOCK		x		x								x	x					x				Applicable in Drop and Insert Only
TX OVRSMPL PLL UNLOCKED	x		x						x			x	x					x				
TX IDR PLL UNLOCKED			x	x					x				x					x				

*When EXT EXC is used as a reference for the Mod Clock, and activity on the EXT EXC is lost, the modem switches Tx clock reference to SCTE if it exists, otherwise it switches to SCT. When SCT is used as a reference, and activity is lost, the modem switches Tx reference to SCT

4.4 IBS Fault Conditions and Actions

Figure 4-1 and Table 4-5 illustrate the IBS Fault Conditions and Actions to be taken at the Earth Station, at the Terrestrial Data Stream and the Satellite. These faults include those detected on the Terrestrial link and those detected from the satellite.

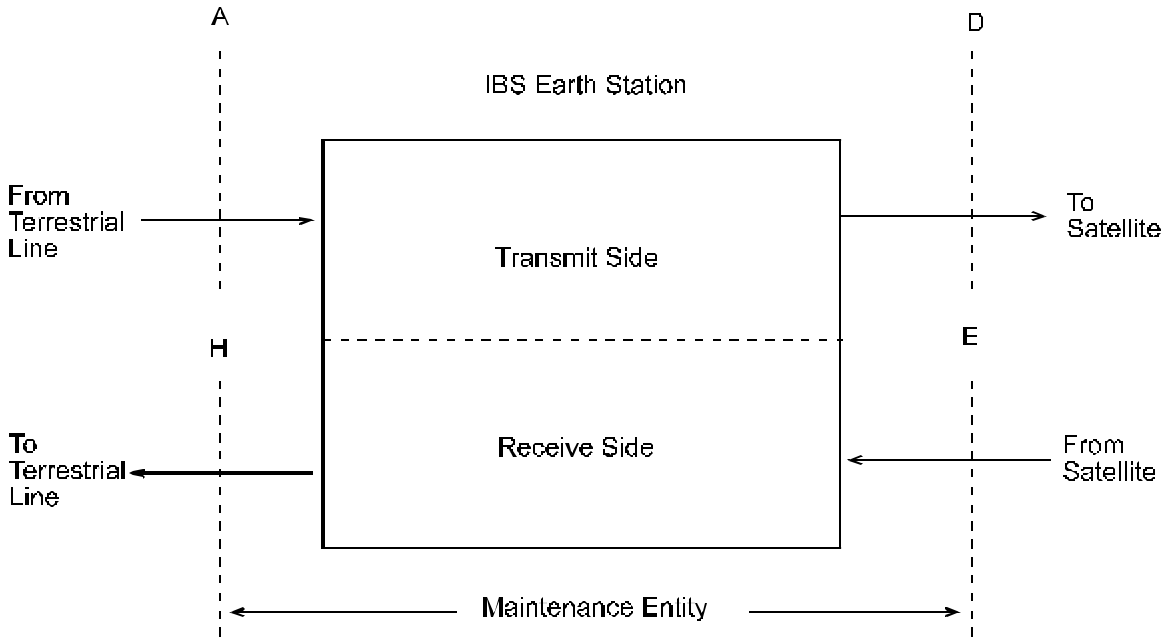


Figure 4-1. IBS Alarm Concept

Table 4- 5. IBS Fault Conditions and Actions (Includes Drop and Insert)

Fault Detected on Terrestrial Link (Across Interface A)	Action In Earth Station	Action to Terrestrial (Across Interface H)	Action to Satellite (Across Interface D)
FA1 Loss of Terrestrial Input	AS1,2 IBS Prompt, Service Alarm	AH2 '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD1 AIS in Relevant TS's
FA2 Loss of Terrestrial Signaling	AS1 IBS Prompt Alarm	AH2 '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD3 '1111' in RelevantTS16's
FA3 Loss of Terrestrial Frame	AS1 IBS Prompt Alarm	AH2 '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD1 AIS in Relevant TS's
FA4 Loss of Terrestrial Multiframe	AS1 IBS Prompt Alarm	AH2 '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD3 '1111' in Relevant TS16's
FA5 BER of 1E-3 or Greater on Terrestrial Input	AS1 IBS Prompt Alarm	AH2 '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD1 AIS in Relevant TS's
FA6 Alarm Indication Received on Terrestrial Input	---	---	AD2 '1' in Bit 3 of Byte 32
Fault Detected From Satellite (Across Interface E)			
FA1 Loss of Satellite Signal Input	AS1,2 IBS Prompt, Service Alarm	AH1, 3 AIS in TS's, '1111' in TS16	AD2 '1' in Bit 3 of Byte 32
FA2 Loss of Satellite Frame	AS1,2 IBS Prompt, Service Alarm	AH1, 3 AIS in TS's, '1111' in TS16	AD2 '1' in Bit 3 of Byte 32
FA3 Loss of Satellite Multiframe	AS1,2 IBS Prompt, Service Alarm	AH1, 3 AIS in TS's, '1111' in TS16	AD2 '1' in Bit 3 of Byte 32
FA4 BER of 1E-3 or Greater From Satellite Input	AS1,2 IBS Prompt, Service Alarm	AH1, 3 AIS in TS's, '1111' in TS16	AD2 '1' in Bit 3 of Byte 32
FA5 Alarm Indication Received From Satellite Input	AS2 IBS Service Alarm	AH2 '1' in Bit 3 of NFAS TS0, Yellow Alarm	---

Section 5 - Principles of Operation

5.0 DMD10 Modem Principles of Operation

The Modem units contained in the RCS10 are designated as DMD10 modems. The DMD10 Modem is designed in three major sections; Universal Interface, Baseband Processing, and Universal Modem. Each section resides on a PC Card within the DMD10.

5.1 Universal Interface Modules (UIM)

The Universal Interface Modules (UIM) are field-replaceable modules that plug into the rear of the RCS10. The UIMs provide the interconnection points (J3-J8) for terrestrial data and clock to the modem. The UIMs also contain a connection port for an asynchronous data channel (J9) for use in Earth Station to Earth Station (ES/ES) communications. Additionally, the UIM provides connection points (J11) for Form-C modem status relays. An illustration of one UIM is shown in Figure 5-1, and a functional block diagram is shown in Figure 5-1A. Any reference to the Universal Interface Modules hereafter will be in singular terms as the modules are identical.

Before powering up the RCS10 or attaching cables to J12 (Sync Data RS422/RS485/V.35), the following steps **MUST** be verified in order to avoid damage to the equipment. Ensure the following:

1. The cables must be wired correctly. Refer to Table 2-1, J12 Sync Data, RS422/RS485/V.35;
2. The External Interface is programmed or supports the appropriate Interface type: RS232, RS422, or V.35;
3. The Universal Interface Module (UIM) is configured for the appropriate Interface type: RS232, RS422 or V.35.

   This is **EXTREMELY IMPORTANT** as the Interface pins operate at different voltage levels depending upon the Interface type selected. **SERIOUS DAMAGE** may occur, for example, if the External Interface is operating at V.35 voltage levels and the Universal Interface is configured for RS422 voltage levels.

5.1.1 Synchronous Interface

Synchronous Tx data and clock enters the UIM and is routed to either the RS-422, RS-232, or V.35 receiver as the selected monitor and control processor, where the signals are converted to an RS-422 balanced format and sent to the Baseband (BB) Processor card. Receive data from the BB processor card undergoes the reverse process where it is converted from RS-422 balanced format and routed to the RS-422 or V.35 drivers.

5.1.2 G.703 Interface

Either balanced or unbalanced G.703 data is routed from the 'Send Data In' connections to the G.703 receiver. The G.703 receiver recovers a clock from the data stream, converts the clock and data to an RS-422 balanced format, and routes the clock and data to the Baseband Processor. The reverse process is performed on the receive data stream where the G.703 data exits the modem at the 'Receive Data Out' connection. The G.703 interface is designed to operate at the following rates;

T1 (1.544 Mbps), E1 (2.048 Mbps), T2 (6.312 Mbps), and E2 (8.448 Mbps). Additionally, the line code is selected when the interface type is selected with the exception that T1 may use B8ZS or AMI as selected at the front panel.

The G.703 interface also contains two additional ports that can operate at T1 or E1 that provides a 4-port Drop & Insert interface. The 'Send Data Out' port provides an unaltered send data output that can be used for daisy chaining additional systems. On the receive side, a T1 or E1 data stream can be connected to the 'Insert Data In' port where received data will overwrite 'dropped on' the T1/E1 data stream. The modified T1/E1 data stream will then exit the modem out of the 'Receive Data Out' port.

5.2 96 Kbps ESC Port

The ESC port (J10) sends and receives a 96 Kbps data stream formatted for IESS-308. Data is routed between the BB Processor card framing unit and the external ESC channel unit. The interface is designed for RS-422 balanced signal levels and contains Tx Data In, Rx Data Out, and Tx Clock Out.

5.3 Terrestrial Loopback

The UIM module also provides for terrestrial loopback. For Tx Terr loopback, Tx Data, after passing through the line interface is looped back to the Rx data line drivers. For RX Terr loopback, the receive data from the satellite is looped back for retransmission to the satellite providing a far end loopback. Tx/Rx loopback provides both loopbacks simultaneously.

5.4 Modem Status

The UIM provides several status indications that are controlled by the M&C processor.

Mod Fault - De-energized when any transmit side fault is detected.

Demod Fault - De-energized when any receive side fault is detected.

Common Fault - De-energized when any fault that is not explicitly a Tx or Rx fault such as an M&C or power supply fault.

5.5 Baseband Processor Card

The Baseband processor card (BB Card) contains two major subsystems-- the Baseband Processing System and the Monitor and Control Subsystem.

5.5.1 Baseband Processing

The baseband processor performs all of the functions required for an IBS/IDR Framing unit, a Reed-Solomon Codec, and an E1/T1 Drop and Insert system. In addition, the baseband processing section provides for Transmit clock selection and rate adaptation as well as a rate adapter and Plesiochronous/Doppler (PD) Buffer in the receive direction. A multiplexer is also provided for the SCT clock source for loop timing applications. The transmit and receive paths may be configured independently under processor control.

5.5.2 Tx Baseband Processing

As shown in Figure 5-1, the Tx Data and clock enters the baseband processor, passes through a rate adapting FIFO and enters the Framer/Drop processor. In closed-net mode, the data passes through the framer unaltered. In IDR, IBS, and Drop and Insert modes the framer adds the appropriate framing and ESC as defined in IESS-308 and 309. In D&I mode, the framer acquires the terrestrial framing structure, E1 or T1, and synchronizes the drop processor. The drop processor extracts the desired time slots from the terrestrial data stream and feeds these channels back to the framer. The framer then places the 'dropped' terrestrial time slots into the desired satellite channel slots. The data is then sent to the Reed-Solomon encoder.

The Reed-Solomon encoder, if engaged, is designed as an installable option which encodes the data into Reed-Solomon blocks. The blocks are interleaved and synchronized to the frame pattern as defined in IESS-308 and IESS-309. After RS encoding, the composite data and clock are applied to the BB loopback circuit.

5.5.3 Rx Baseband Processing

The receive processor performs the inverse function of the Tx processor. Data received from the satellite passes through the BB loopback circuit to the Reed-Solomon decoder to the deframer. The deframer acquires the IBS/IDR frame, synchronizes the Reed-Solomon decoder, and extracts the received data and overhead from the frame structure, placing the data into the PD Buffer, sending the overhead data to the UIM module. In closed-net mode, the data is extracted from the buffer and is sent to the UIM module. Backward alarm indications are sent to the M&C subsystem. If in Drop and Insert mode, the insert processor synchronizes to the incoming terrestrial T1/E1 data stream, extracts satellite channels from the PD buffer, and then inserts them into the desired terrestrial time slots in the T1/E1 data stream.

5.5.4 Clock Selection

Both the Tx Clock and the Buffer Clock source may be independently locked to one of the following:

SCT (Internal Oscillator), SCTE (External Tx Terrestrial Clock), EXC clock (External Clock Source), or Rx Satellite Clock (Loop Timing). Additionally, for loop timing applications, the SCT clock source can be selected to be Rx Satellite Clock.

5.5.5 Baseband Framing/Multiplexing

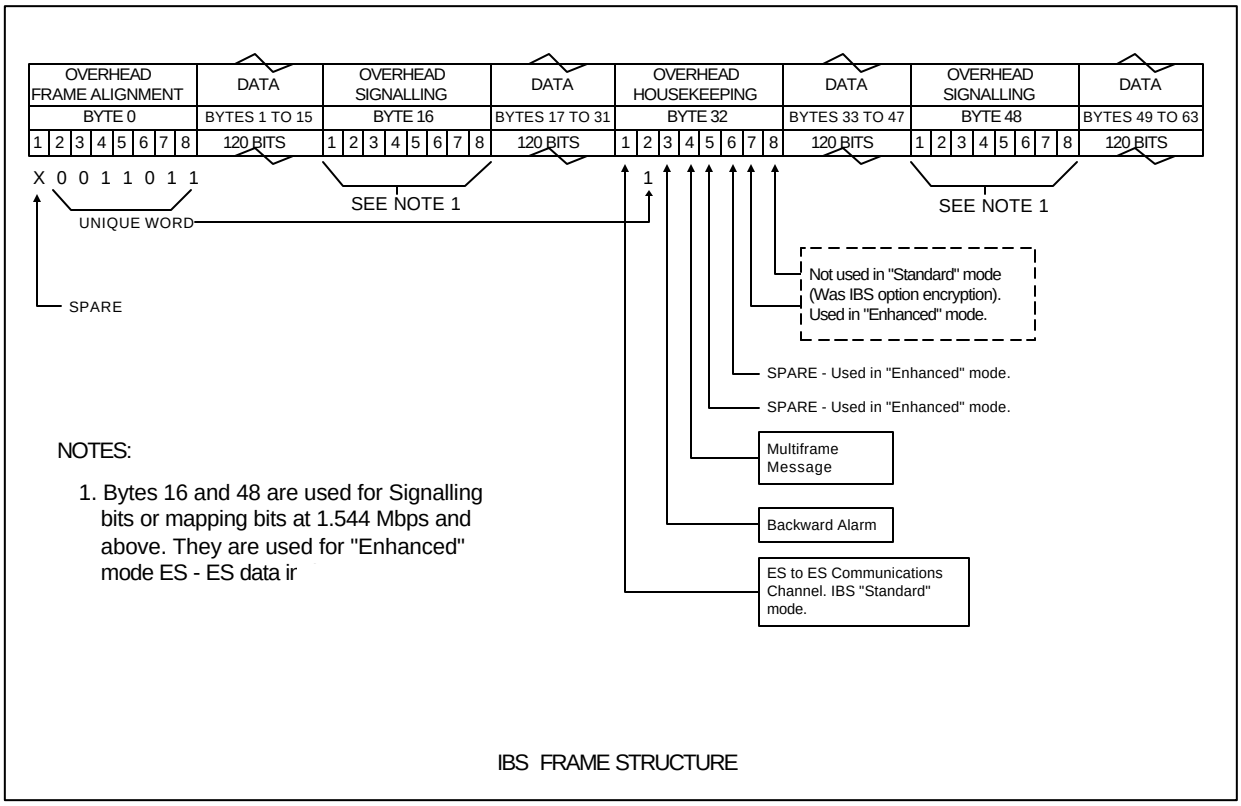
The framing/multiplexer is capable of multiplexing a relatively low-speed overhead channel onto the terrestrial data stream resulting in a slightly higher combined or aggregate data rate through the modem. The overhead channel is recovered at the far end. The type of data carried in this overhead channel depends upon the type of framing selected for the Modulator and Demodulator. Framing type 1_15 is specified by the IESS-309 standard and is commonly known as IBS overhead. Framing type 96K is specified by the IESS-308 standard and is commonly known as IDR overhead.

The basic frame structure used by the multiplexer is that specified in the IESS-309 standard, Page 60, Figure 10, resulting in a 16/15 aggregate to through data ratio. Most of the IESS Framing Structure diagram is shown below.

Two software controlled modes are designed into the card to best utilize the available bits; “Normal” and “Enhanced”. The characteristics of the channel interface is also determined by the normal or enhanced mode.

The ES to ES Data Channel can be set under software-control to either RS-232 or RS-485 mode. The connector at the rear of the UIO module labeled “Async” or “ES-ES” carries this data. Refer to section 2 for the pin assignments.

In the Enhanced mode, a 2-wire receive operating mode can be selected for the receive data into the ES-ES channel. In this mode the receive input is muted while the transmit data output is active. In 4-wire mode the receive is always enabled. In the normal IBS mode only the 4-wire mode is available. Note that the transmit and receive pairs are physically separate wires and must be connected together if true RS-485 2-wire connectivity is desired.



IBS FRAME STRUCTURE

5.5.5.1 Standard IBS Mode

In the first or "Normal" mode, all bit assignments are per the IBS standard. The bits of Overhead Housekeeping byte 32 are implemented as shown below:

Bit 1 - *ES to ES Data Channel* — This bit is routed directly to the ES to ES Data Channel. Its data rate is 1/512th of the aggregate rate (or 1/480th of the through terrestrial data rate), and is normally used to super-sample an asynchronous data channel.

Bit 2 - — Part of the Frame Alignment word.

Bit 3 - *Backward Alarm* — Transmit and Receive with main processor to activate main alarm/LED

Bit 4 - *Multiframe Message* — As per IBS

Bits 5 and 6 - *Spare* — Not currently Utilized

Bits 7 and 8 - *Encryption Utilization* — Not currently Utilized

The ratio of the through terrestrial data channel rate to the aggregate rate is 15/16.

The standard transmit and receive channels of the ES to ES data channel in standard IBS mode are raw channels operating at the specific bit rate as controlled by the data channel rate, without buffering. Also no clocks are provided with this channel. Since it would be rare that the data rate provided was exactly that required for a standard rate device, the only method of communicating using this channel is to allow it to over-sample the user data. The ES to ES data channel rate should normally then be a minimum of 3 times the desired asynchronous rate to work properly, while 4 times the desired rate would have fewer errors.

5.5.5.2 Enhanced Multiplexer Mode

Since many of the frame bits in the standard IBS mode are not used, an "Enhanced" multiplexer mode has been implemented that can be engaged under software control. Since this mode changes the use of many of the framed non-data bits, this mode is only usable when the DMD10 is at both ends of a link. In this mode, the overhead signaling bytes 16 and 48 can be used to implement a significantly higher speed ES to ES Data Channel under software control. When implemented, this rate is 16 times that of the normal IBS standard, or 1/30th of the terrestrial data rate (1/32nd of the aggregate rate). In addition, spare bit 1 of byte 1 and bit 6 of Byte 32 are used as flags indicating that enhanced asynchronous data is present.

NOTE: The Enhanced Async option requires that CLOSED NET mode must be selected as the current mode. Since Enhanced Asynchronous operation does not conform to the IESS-309 standard, it is not an IBS mode function.

The microprocessor on the interface board performs software/hardware assignment of bits to specific purposes in the enhanced mode and buffers the ES to ES Data Channel to standard asynchronous data rates.

The processor-controlled primary and secondary ES-ES channels each contain both transmit and receive data buffers which are 32 bytes in length. These act as FIFOs on the data in each direction. No data is lost if the actual ES-ES data channel and the buffered user data rates are different unless the sustained user data rate causes the buffer to overflow. Buffer overflow results in purging the entire buffer contents. Gaps between characters or messages do not use the buffer and thus can be used to prevent overflow. If the user data rate is less than the data channel rate, then there are simply gaps between characters, which is normal in asynchronous communications. The Enhanced Asynchronous function is available in the following Drop and Insert modes only: PCM31 and PCM30C. All other Drop and Insert modes require signaling information to be carried in bytes 16 and 48 of the IBS frame.

5.6 Additional Clocking Data

SCTE: Serial Clock Transmit External

This clock is the transmit terrestrial clock associated with the interface. With the G.703 interface selected SCTE is the clock that is recovered from the G.703 data stream. For synchronous interfaces such as RS-422, SCTE is sometimes referred to as TT (Terminal Timing).

SCT: Serial Clock Transmit

This clock is an internally generated clock that is output from the modem. The clock is generally used by the terrestrial terminal equipment for clocking the transmit data. The frequency of the clock is set to be the same as the transmit terrestrial clock rate if internal is selected or is the receive clock from the demodulator if SCR is selected.

INT CLK: Internal Clock

This clock is set to the Tx data rate and is used inside the modem to produce SCT clock.

SYSTEM EXT EXC: External Clock

This is an independent clock source. This clock is most often used if there is a station master clock. The EXT EXC can be selected, in the interface/general menu, to be either balanced, unbalanced, or IDI. IDI is used ONLY for Drop & Insert cases where external framing is selected. In this case, the EXT EXC must be set to IDI where the receive buffer clock is derived from the External Receive T1 or E1 trunk. You may select the location from which to retrieve the EXT EXC. A system clock is available and the frequency is set in the Config. Switch Menu (See Section 3).

The External Clock can then be connected to the External Reference Card and is then made available to all modems for selection. Should another clock be desired other than the system clock, it may be connected to the modem's associated UIM and then selected for use through the Interface Configuration Menu.

BNC EXC: BNC External Clock

Unbalanced external clock input into BNC connector J5.

Clock specification:

Frequency: 256 KHz - 10 MHz in 8 KHz steps

Level: 0.5 V pp to 5 V pp

NOTE: When using the external clock port, the External Clock Frequency MUST match the data rate.

IDI: Insert Data In

This clock source is only used for an external frame source selected in D&I mode. If External Frame Source is selected, then IDI must be selected for the buffer clock. For this case a Receive T1/E1 trunk is input into J5 and a buffer clock is derived.

SCR: Serial Clock Receive

This is the Receive Clock that is recovered from the receive signal from the satellite.

EXT IF REF: External IF Reference

This is not actually a clock, but does have some clocking implications. When External Reference is used, the master oscillator within the DMD10 Modem is locked to the External Reference and the internal accuracy and stability of the DMD10 assumes that of the External Reference. Therefore, not only are the transmit and receive frequencies of the DMD10 locked to the External Reference, but the modem's internal SCT oscillator is locked to the External Reference as well. SCT can then be used as an ultra-stable clock.

Transmit Timing

Transmit terrestrial data enters the modem and is clocked into a dejitter FIFO. Data is clocked out of the FIFO by the modulator clock. The Modulator Clock and PLL, in concert with the Dejitter FIFO, reduces the input jitter. Jitter reduction exceeds the jitter transfer specified in CCITT G.821.

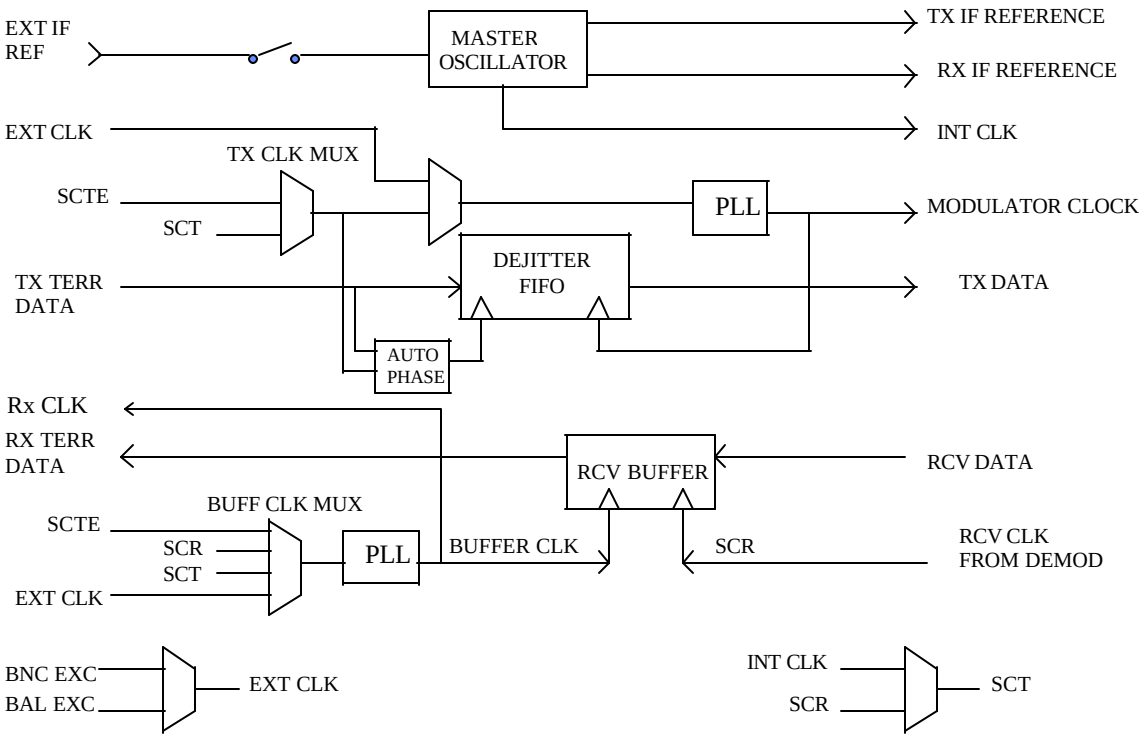
RS-422 or V.35 Interface

EXT CLK as TX Clock Source

Data must be clocked into the modem by either the SCTE or SCT source. If EXT CLK is selected as the Tx clock source, then SCTE must be supplied to the modem and the output of the dejitter buffer will be clocked with EXT CLK. This case should only be used if SCTE has excessive jitter and will degrade link performance.

SCTE or SCT

If SCT is selected then only data -synchronous to the SCT clock- is required to be supplied to the modem. It is intended for the terminal equipment to use the SCT as its clock source. The autophase circuit will automatically ensure that the data is clocked correctly into the modem so a return clock is not necessary. The TX CLK PHASE should be set to AUTO.



DMD10 Clock Logic

If SCTE is selected, then SCTE must be supplied to the modem. The Tx CLK PHASE should be set to AUTO.

G.703 Interface

If the G.703 interface is selected, then the Tx clock source must be set to SCTE and the TX CLK PHASE should be set to AUTO.

Receive Timing

Any of the selections, SCTE, SCT, EXT CLK, or SCR may be selected as the buffer clock. Data will be clocked out of the buffer at the data rate synchronous, to selected clock source.

Loop Timing

If loop timing is desired i.e., the modem timing is slaved to the far end master station, the modem clocks can be configured as follows:

Transmit

RS-422 or V.35 Interface

Set SCT Source to SCR. The Tx terminal equipment should clock the TX data with the SCT clock and return data and SCTE (Optional). If SCTE is returned to the modem from the terminal equipment set TX CLK to SCTE. If SCTE is not returned to the modem, set TX CLK to SCT.

The TX CLK PHASE should be set to AUTO.

G.703 Interface

If the G.703 interface is selected, then the Tx clock source must be set to SCTE and the TX CLK PHASE should be set to AUTO.

Receive

Select the Buffer clock to SCR.

5.7 Monitor & Control Subsystem

Also contained on the Baseband Card is the Monitor and Control (M&C) subsystem. The M&C contains a high-performance Motorola 68302 microprocessor and is responsible for overall command and control of all DMD10 functions. The M&C is constantly monitoring all subsystems of the modem by performing a periodic poll routine and configures the modem by responding to commands input to the system. During each poll cycle, the status of each of the subsystems is collected and reported to each of the external ports and front panel. Performance statistics such as Eb/No, buffer fill %, etc. are compiled. If faults are detected, the M&C will take appropriate actions to minimize the effect of such faults on the system (Refer to the Fault Matrices in Troubleshooting Section of this manual).

The M&C subsystem contains the following features:

Asynchronous serial port #1: This port is dedicated to the terminal program. With this program, all features of the modem may be controlled and monitored by any common terminal connected to the terminal port.

Serial Port #2: This port is dedicated to the modem remote port. This port may be configured to support a number of synchronous or asynchronous protocols such as HDLC, and RS-485. This port is intended for use in computer-based remote monitor and control. All functions of the modem may be monitored and controlled from this port.

Serial Port #3: This port is dedicated for ES-ES communications. The port may be configured for a number of communications protocols. Overhead data to/from the UIM is routed to/from the Framer/Deframer.

Clock: The time and date is kept in order to ‘time-tag’ system events.

Watchdog Timer: The Watchdog Timer monitors the health of the M&C subsystem.

Program Flash ROM: The 512K of reprogrammable program ROM (expandable to 1MB) is available to the M&C.

RAM: 128K RAM (expandable to 512K)

Non-Volatile RAM: 8K of non-volatile RAM (expandable to 32K) is provided in order to hold the modems current configuration. In case of interruption of power, the M&C will reconfigure the modem identically to the state before power was lost.

5.8 Universal Modem

The Universal Modem (UM) card contains a complete variable-rate Modulator/Demodulator intended for satellite communications. The UM utilizes the latest digital technology for high reliability and versatility. The Modulator and Demodulator sections may be configured independently under processor control. The UM includes a dual band 70/140 MHz IF, QAM Modulator/Phase Lock

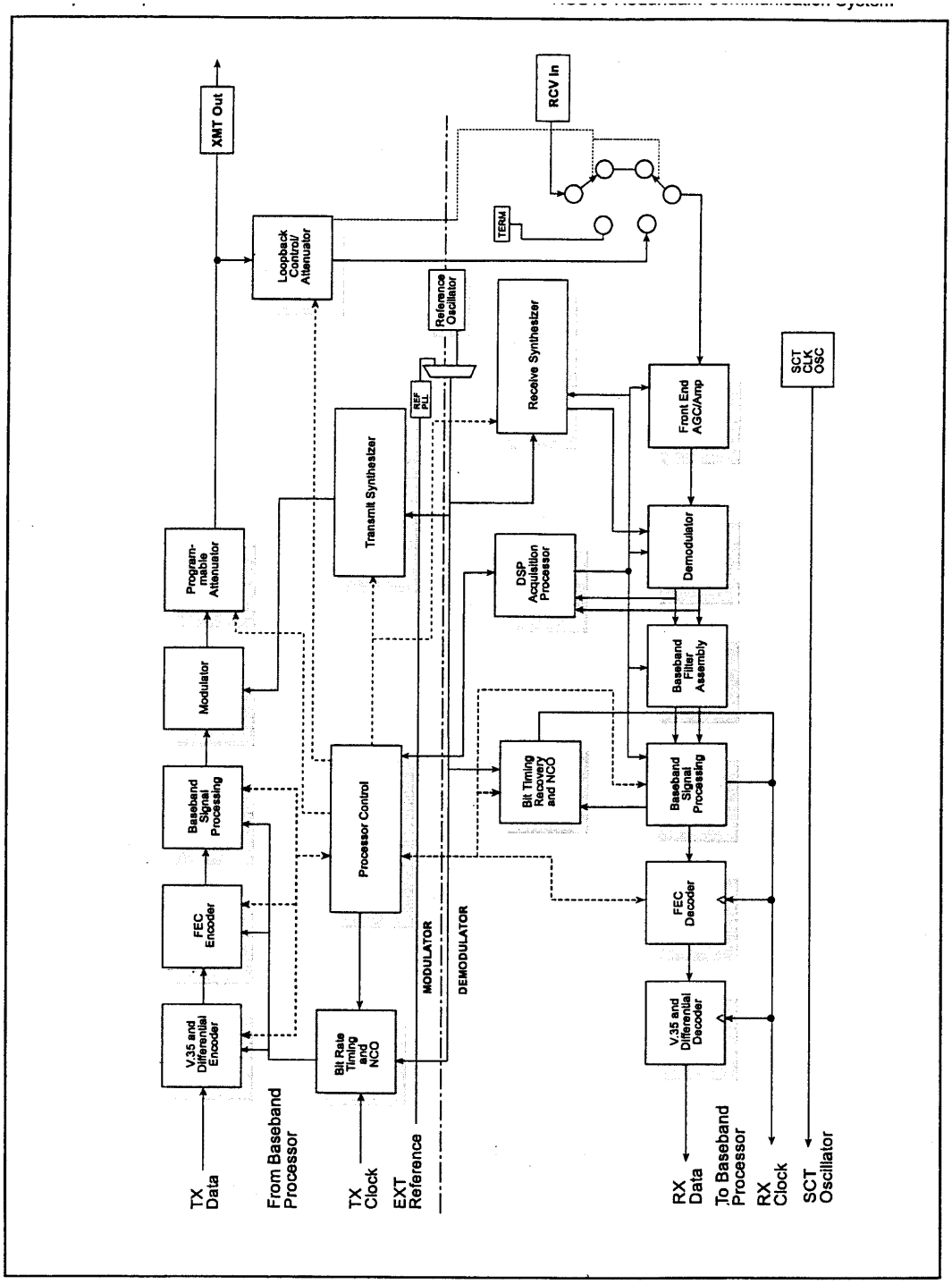
Receiver, Convolutional Encoder/Viterbi Decoder, Sequential Decoding Option, Differential Encoder/Decoder, and a V.35 Scrambler/Descrambler.

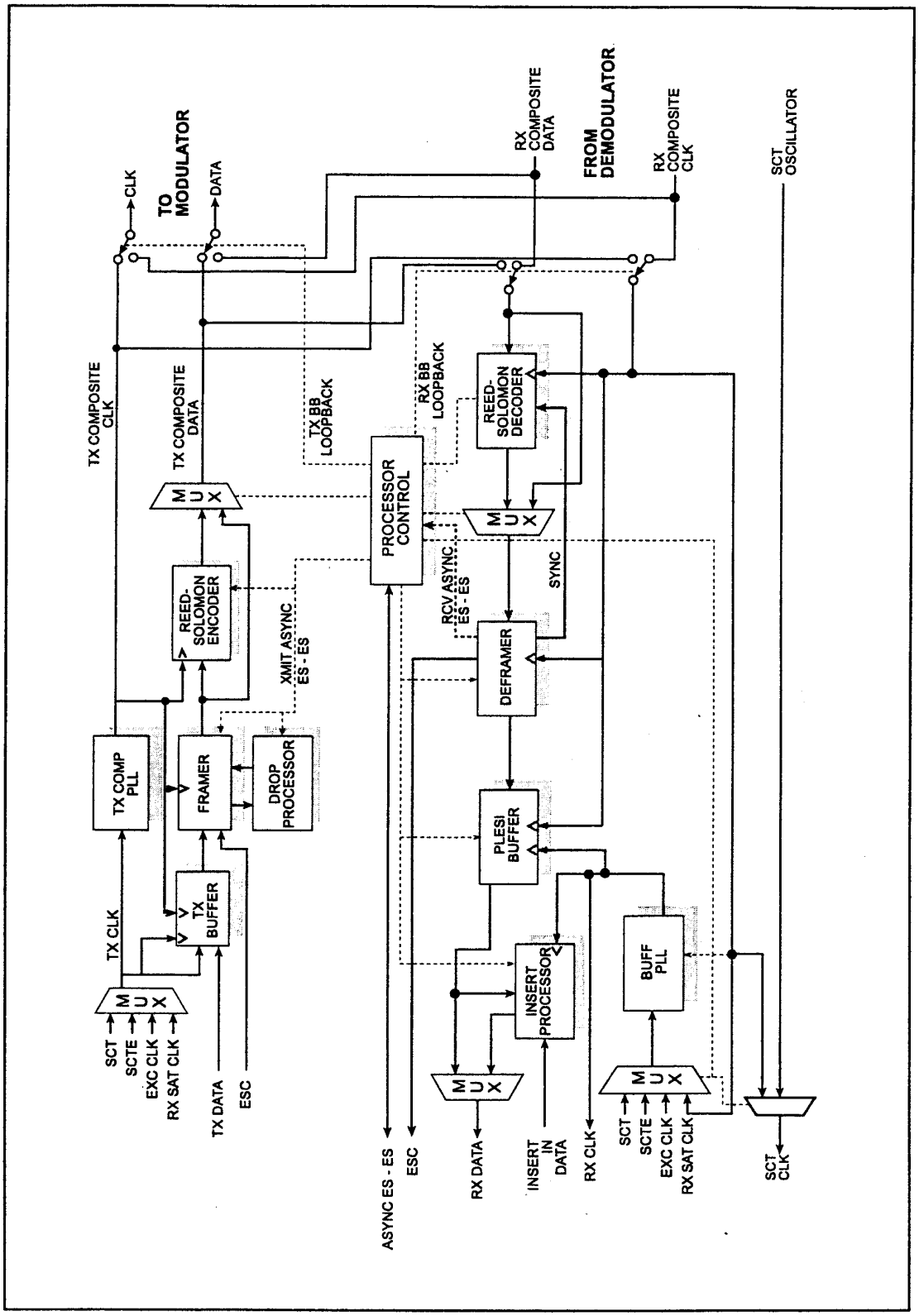
5.8.1 Modulator

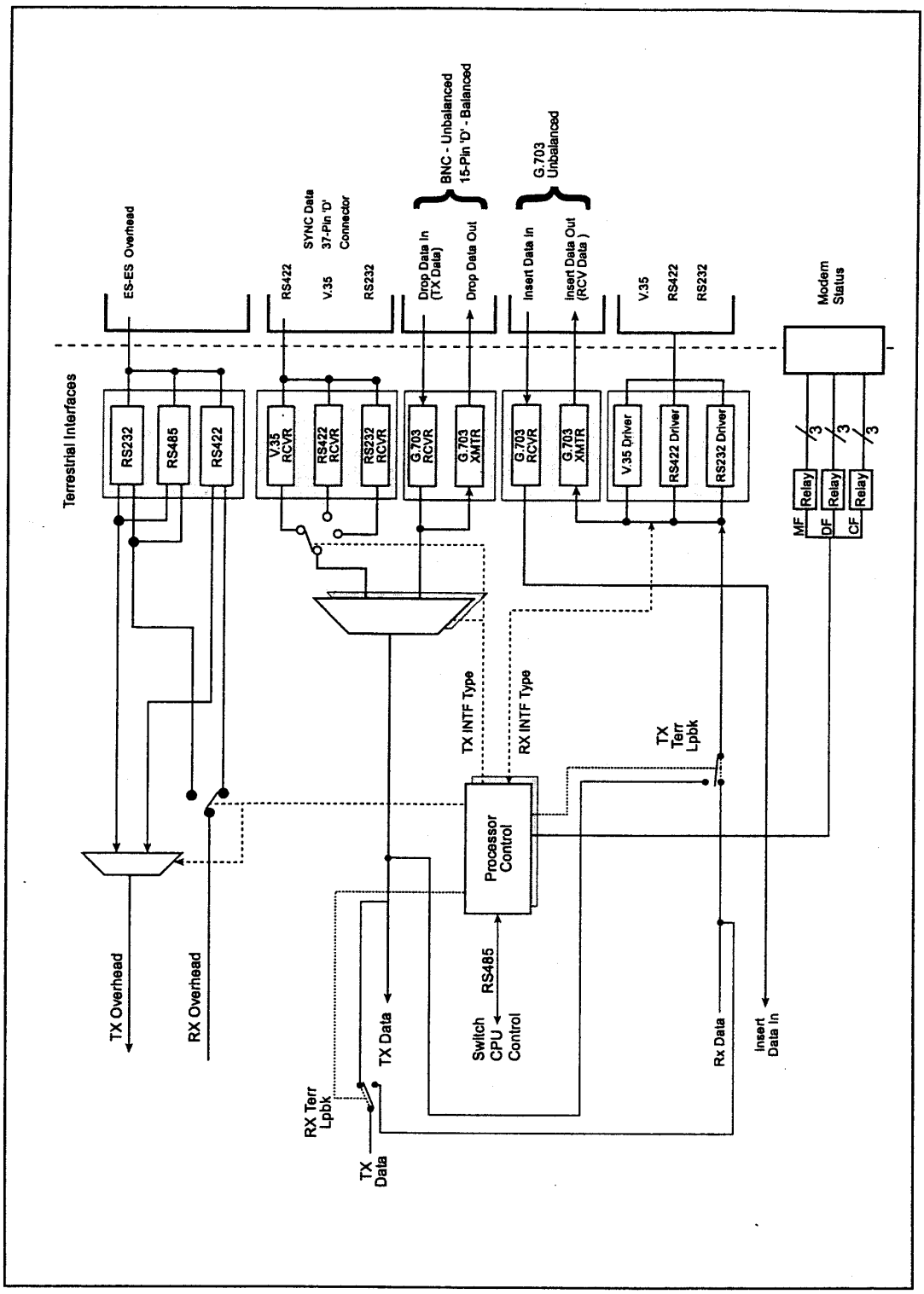
Processed baseband data ready for transmission enters the modulator and undergoes, if the functions have been enabled, V.35 scrambling and differential encoding. The data then undergoes convolutional encoding and is fed to the dual variable interpolating FIR filter. The FIR filter shapes the data waveform to a predefined spectral mask and vectorizes the data for mapping into a PSK constellation. The data is then converted to an analog waveform and is vector-modulated onto an RF carrier produced from the transmit IF synthesizer circuitry. The final output is then fed to the IF loopback circuitry where under microprocessor control the transmit signal may be routed to the demodulator. Due to its nearly complete digital implementation, the modulator is capable of performing virtually any modulation format, and can produce almost any desired spectral mask. The modulator also houses the SCT oscillator and the reference oscillator. The reference oscillator provides the frequency standard for both the modulator and demodulator. An external reference may also be selected. In this case, the reference oscillator is locked to the external reference.

5.8.2 Demodulator

The demodulator performs a complete digital implementation of a variable rate phase lock satellite receiver utilizing state-of-the-art digital signal processing (DSP) techniques. The demodulator is capable of receiving nearly any modulation format. Signals enter the demodulator, are converted to baseband, split into ‘I’ In phase and ‘Q’ Quadrature channels and digitized. The digitized I and Q channels are then applied to a decimating FIR matched filter. After filtering, the signal is demodulated using a Costas loop for recovery of the carrier and a clock recovery loop for recovery of bit timing. The demodulated data is then fed to a 1650 Viterbi decoder, or sequential decoder if the option is installed. After decoding, the data is differentially decoded and descrambled.


XMT Out
RCV In
Loopback Control/ Attenuator
TERM
Reference Oscillator
Receive Synthesizer
SCT CLK OSC
REF PLL
Transmit Synthesizer
Front End AGC/Amp
Programmable Attenuator
DSP Acquisition Processor
Demodulator
Modulator
Baseband Filter Assembly
Baseband Signal Processing
Processor Control
Bit Timing Recovery and NCO
Baseband Signal Processing
FEC Encoder
FEC Decoder
MODULATOR
DEMODULATOR
V.35 and Differential Encoder
Bit Rate Timing and NCO
V.35 and Differential Decoder
TX Data
From Baseband Processor
TX Clock
EXT Reference
RX Data
To Baseband Processor
RX Clock
SCT Oscillator


TO MODULATOR
CLK
DATA
FROM DEMODULATOR
RX COMPOSITE DATA
RX COMPOSITE CLK
SCT OSCILLATOR
TX COMPOSITE CLK
TX COMPOSITE DATA
TX BB LOOPBACK
RX BB LOOPBACK
REED-SOLOMON DECODER
PROCESSOR CONTROL
MUX
REED-SOLOMON ENCODER
XMIT ASYNC ES - ES
RCV ASYNC ES - ES
SYNC
DEFRAMER
TX COMP PLL
FRAMER
DROP PROCESSOR
PLESI BUFFER
TX BUFFER
TX CLK
INSERT PROCESSOR
BUFF PLL
SCT
SCTE
EXC CLK
RX SAT CLK
TX DATA
ESC
ASYNC ES - ES
RX DATA
INSERT IN DATA
RX CLK
SCT CLK


ES-ES Overhead
SYNC Data
37-Pin 'D' Connector
V.35
RS232
RS422
BNC - Unbalanced
15-Pin 'D' - Balanced
Drop Data In (TX Data)
Drop Data Out
G.703 Unbalanced
Insert Data In
Insert Data Out (RCV Data)
V.35
RS422
RS232
Modem Status
Terrestrial Interfaces
RS232
RS485
RS422
V.35 RCVR
RS422 RCVR
RS232 RCVR
G.703 RCVR
G.703 XMTR
G.703 RCVR
G.703 XMTR
V.35 Driver
RS422 Driver
RS232 Driver
3
3
3
Relay
Relay
Relay
MF
DF
CF
TX INTF Type
RX INTF Type
TX Terr Lpbk
Processor Control
TX Overhead
RX Overhead
RS485
Switch CPU Control
TX Data
Rx Data
Insert Data In
RX Terr Lpbk
TX Data

5.9 Drop and Insert (D&I)

The Radyne ComStream DMD10 Drop & Insert (D&I) function provides an interface between a full T1 or E1 trunk whose framing is specified in CCITT G.704 and a fractional n x 64 Kbps satellite channel that conforms to the IBS and small IDR framing structures. The Drop function allows the user to select the terrestrial T1 or E1 timeslots that are to be dropped off for transmission over the link in the specified satellite channels. The Insert function allows the user to select the T1 or E1 timeslots into which the received satellite channels are to be inserted. The two functions are completely independent allowing maximum flexibility in choosing configurations. The four port G.703 interface allows one or more modems to be looped together using the same T1 or E1 trunk.

The transmit data trunk is brought into the modem via the Send Data In (SDI) port. From there, the TX baseband processor extracts the selected timeslots from the G.704 frame and prepares them for transmission. The original trunk data is sent out of the modem unaltered via the Send Data Out (SDO) port. The receive data trunk is brought into the modem via the Insert Data In (IDI) port. The data is buffered inside the modem and the RX baseband processor inserts satellite data into the selected timeslots in the G.704 frame. The modified terrestrial trunk is then output via the Receive Data Out (RDO) port.

Figure 5-3 shows two modems looped together. This configuration could be simplified to just use one modem, or extended to use more than two modems. Figure 5-4 shows an alternative method of looping where all of the drop (transmit) data is processed prior to performing any insert (receive) processing. In both configurations, the terrestrial trunk is providing the timing for the satellite transmission and for the terrestrial receive.

5.9.1 Drop Only

When Drop is enabled and Insert is disabled, the DMD10 performs a drop only function. Framed E1 or T1 data is input via the Send Data In port, the selected timeslots are dropped into the IBS frame structure, and the unaltered terrestrial data is output via the Send Data Out port (See Figure 5-5).

5.9.2 Insert Only

When Insert is enabled and Drop is disabled, the DMD10 performs an insert-only function. If framed terrestrial E1 or T1 data is available, it should be input via the Insert Data In port. The terrestrial data is buffered inside the modem, the RX baseband processor inserts satellite data into the selected timeslots in the G.704 frame, and the modified terrestrial data is then output via the Receive Data Out port (See Figure 5-6).

If framed terrestrial data is not available, selection of the Internal T1/E1 frame source will cause the modem to generate the required G.704 frame, the satellite data will be inserted into the selected timeslots, and the resulting terrestrial data will be output via the Receive Data Out port. Any non-inserted timelslots in the G.704 frame will be filled with the appropriate idle code (See Figure 5-7).

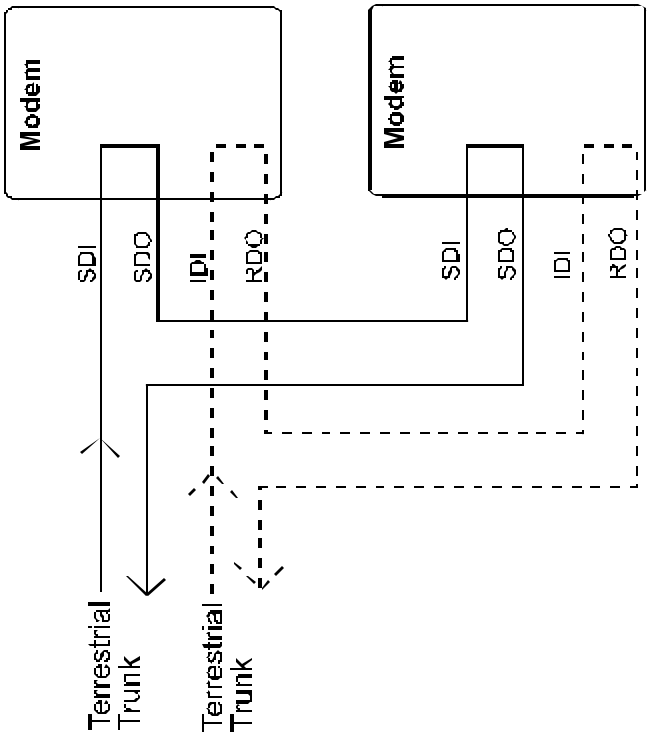


Figure 5-4. Looped Modems with Separate Drop & Insert Trunks

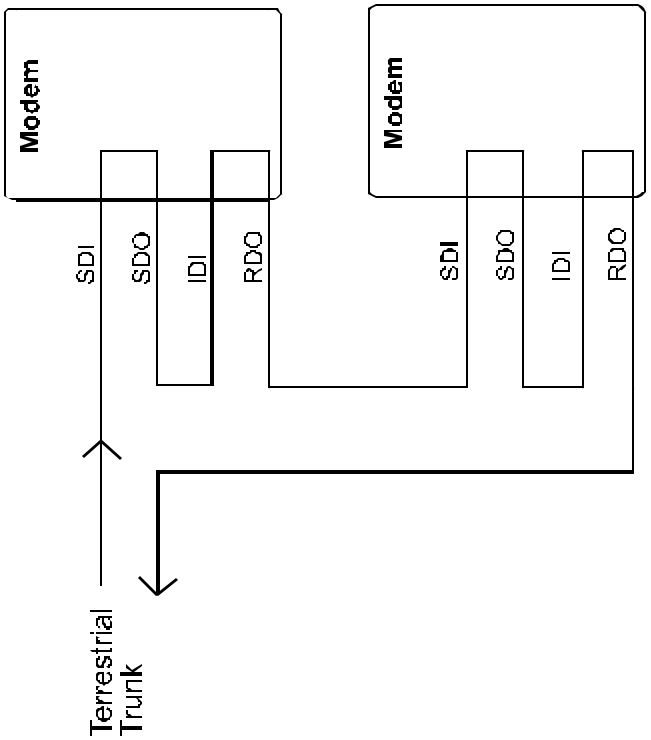


Figure 5-3. Looped Modems

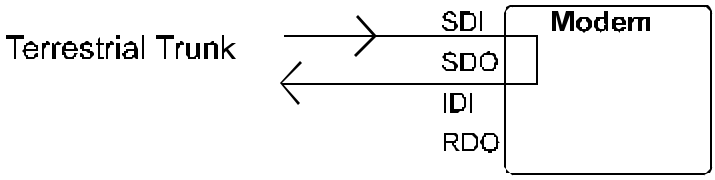


Figure 5-5. Drop Only

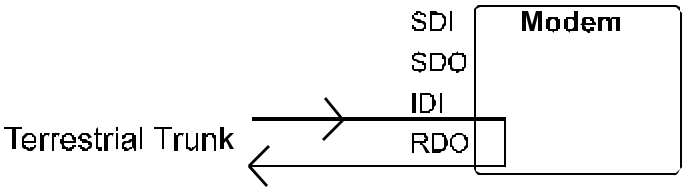


Figure 5-6. Insert Only With External Frame Source

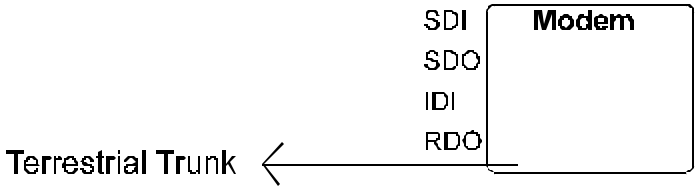


Figure 5-7. Insert Only With Internal Frame Source

5.10 Mode Selection

The DMD10 Drop & Insert can be easily configured to support several commonly used terrestrial data formats. For E1 data, the user can choose between PCM-30, PCM-30C, PCM-31 and PCM-31C. For T1 data, the user can choose between T1-D4, T1-ESF, and SLC-96. The following paragraphs provide more information on the various mode selection capabilities of the DMD10.

5.10.1 PCM-30

The PCM-30 mode of operation supports an E1 interface with Multiframe Alignment Signaling (MFAS) and Channel Associated Signaling (CAS). The user may independently program n timeslots to drop and n timeslots to insert where n = 1, 2, 4, 6, 8, 12, 16, 24, or 30. In addition to the selected drop timeslots, the transmit function also extracts the appropriate ABCD signaling bits from terrestrial timeslot 16 for transmission in IBS frame as required. Conversely, the receive function extracts received ABCD signaling bits from the IBS frame and inserts them in timeslot 16 of the appropriate terrestrial frame. This transmission and reception of ABCD signaling based upon the drop and insert timeslots is performed automatically and is transparent to the user. In PCM-30 mode, the user may not select timeslot 16 as a Drop or Insert timeslot.

5.10.2 PCM-30C

The PCM-30C mode of operation supports an E1 interface with Multiframe Alignment (MFAS) and Channel Associated Signaling (CAS). In addition, the Drop function verifies the received terrestrial CRC checksum and the Insert function calculates the required CRC checksum. The user may independently program n timeslots to Drop and n timeslots to Insert where n = 1, 2, 4, 6, 8, 12, 16, 24, or 30. In addition to the selected Drop timeslots, the transmit function also extracts the appropriate ABCD signaling bits from terrestrial timeslot 16 for transmission in IBS frame as required. Conversely, the receive function extracts received ABCD signaling bits from the IBS frame and inserts them in timeslot 16 of the appropriate terrestrial frame. This transmission and reception of ABCD signaling based upon the Drop and Insert timeslots is performed automatically and is transparent to the user. In PCM-30C mode, the user may *not* select timeslot 16 as a Drop or Insert timeslot.

5.10.3 PCM-31

The PCM-31 mode of operation supports an E1 interface with no Multiframe Alignment (MFAS) or Channel Associated Signaling (CAS). The user may independently program n timeslots to Drop and n timeslots to Insert where n = 1, 2, 4, 6, 8, 12, 16, 24, or 30. Because there is no implied ABCD signaling, the user is free to select timeslot 16 as a Drop or Insert timeslot.

5.10.4 PCM-31C

The PCM-31C mode of operation supports an E1 interface with no Multiframe Alignment (MFAS) or Channel Associated Signaling (CAS). In addition, the Drop function verifies the received terrestrial CRC checksum and the Insert function calculates the required CRC checksum. The user may independently program ‘n’ timeslots to Drop and ‘n’ timeslots to Insert where ‘n’ = 1, 2, 4, 6, 8, 12, 16, 24, or 30. Because there is no implied ABCD signaling, the user is free to select timeslot 16 as a Drop or Insert timeslot.

5.10.5 T1-D4

The T1-D4 mode of operation supports a T1 interface with 12 frames per multiframe. The user may independently program n timeslots to Drop and n timeslots to Insert where n = 1, 2, 4, 6, 8, 12, 16, or 24. In the DMD10, Robbed Bit Signaling (RBS) is handled without any need for operator intervention and is transparent to the user.

5.10.6 T1-ESF

The T1-ESF mode of operation supports a T1 interface with 24 frames per multiframe. The CRC-6 checksum is automatically checked by the Drop function and generated by the Insert function and placed in the appropriate F-bit positions in the terrestrial multiframe. The user may independently program n timeslots to Drop, and n timeslots to Insert, where n = 1, 2, 4, 6, 8, 12, 16, or 24. In the DMD10, Robbed Bit Signaling (RBS) is handled without any need for operator intervention and is transparent to the user.

5.10.7 SLC-96

The T1 SLC-96 mode supports a T1 Interface with 12 Frames per Multiframe (as per T1-D4) except that the signaling frames (F_s bits) are sent twice in succession, and then during the subsequent four signaling frames the F_s bits are replaced with data link information bits. The data frame is composed of six signaling frames with a length of 9 ms. The user may independently program n timeslots to Drop, and n timeslots to Insert, where n = 1, 2, 4, 6, 8, 12, 16, or 24. In the DMD10, Robbed Bit Signaling (RBS) is handled without any need for operator intervention and is transparent to the user.

5.11 Multidestinational Systems

Because the Drop and Insert functions are completely independent, the DMD10 easily supports multidestinational communications. Figure 5-8 illustrates a multidestinational system with one Hub site and three remote sites. At the Hub site, 30 channels are being transmitted to all 3 remote sites and a fractional set of channels is being received from each remote site. At the other end of the link, each remote site is transmitting a fractional E1 to the Hub site as well as receiving all 30 channels from the Hub site, identifying those channels intended for it, and inserting them into the terrestrial data stream.

5.12 Reed-Solomon Codec (Refer to Figures 5-9, 5-10 and Table 5-1)

Utilizing a Reed-Solomon (RS) outer codec concatenated with a convolutional inner codec is an effective way to produce very low error rates even for poor signal-to-noise ratios while requiring only a small increase in transmission bandwidth. Typically, concatenating an RS codec requires an increase in transmission bandwidth of only 9-12% while producing a greater than 2 dB improvement in Eb/No. RS is a block codec where K data bytes are fed into the encoder which adds 2t=(N-K) check bytes to produce an N byte RS block. The RS decoder can then correct up to “t” erred bytes in the block.

5.12.1 Operation in the DMD10

When the Reed-Solomon Codec is enabled, data is fed to the RS encoding section of the DMD10 where it is scrambled, formed into blocks, RS encoded, and interleaved. Unique words are added so that the blocks can be reformed in the receiving modem (Refer to Figure 5-10). Data is then sent to the modulator where it is convolutionally encoded, modulated and transmitted to the satellite.

When the signal is received and demodulated by the receiving modem, it is fed to a Viterbi decoder for the first layer of error correction. After error correction by the Viterbi decoder, the unique words are located and the data is deinterleaved and reformed into blocks. The RS decoder then corrects the leftover errors in each block. The data is then descrambled and output from the RS section.

5.12.2 Reed-Solomon Code Rate

The RS code rate is defined by (N,K) where N is the total RS block size in bytes - data + check bytes - and K is the number of data bytes input into the RS encoder. The transmission rate expansion required by the RS codec is then defined by N/K. The DMD10 automatically sets the correct RS code rate for IDR/IBS open network operation in accordance with the data shown in Table 5-1. In Closed Net mode, the DMD10 allows any N or K setting up to N=255, and K=235 to allow tailoring of the code rate to meet system requirements.

5.12.3 Interleaving

The DMD10 allows for interleaving depths of 4 or 8 RS blocks. This allows for burst errors to be spread over 4 or 8 RS blocks in order to enhance the error correcting performance of the RS codec. For open network modes, the DMD10 automatically sets the interleaving depth to 4 for QPSK or BPSK or 8 for 8PSK. In closed network mode the interleaver depth can be manually set to 4 or 8.

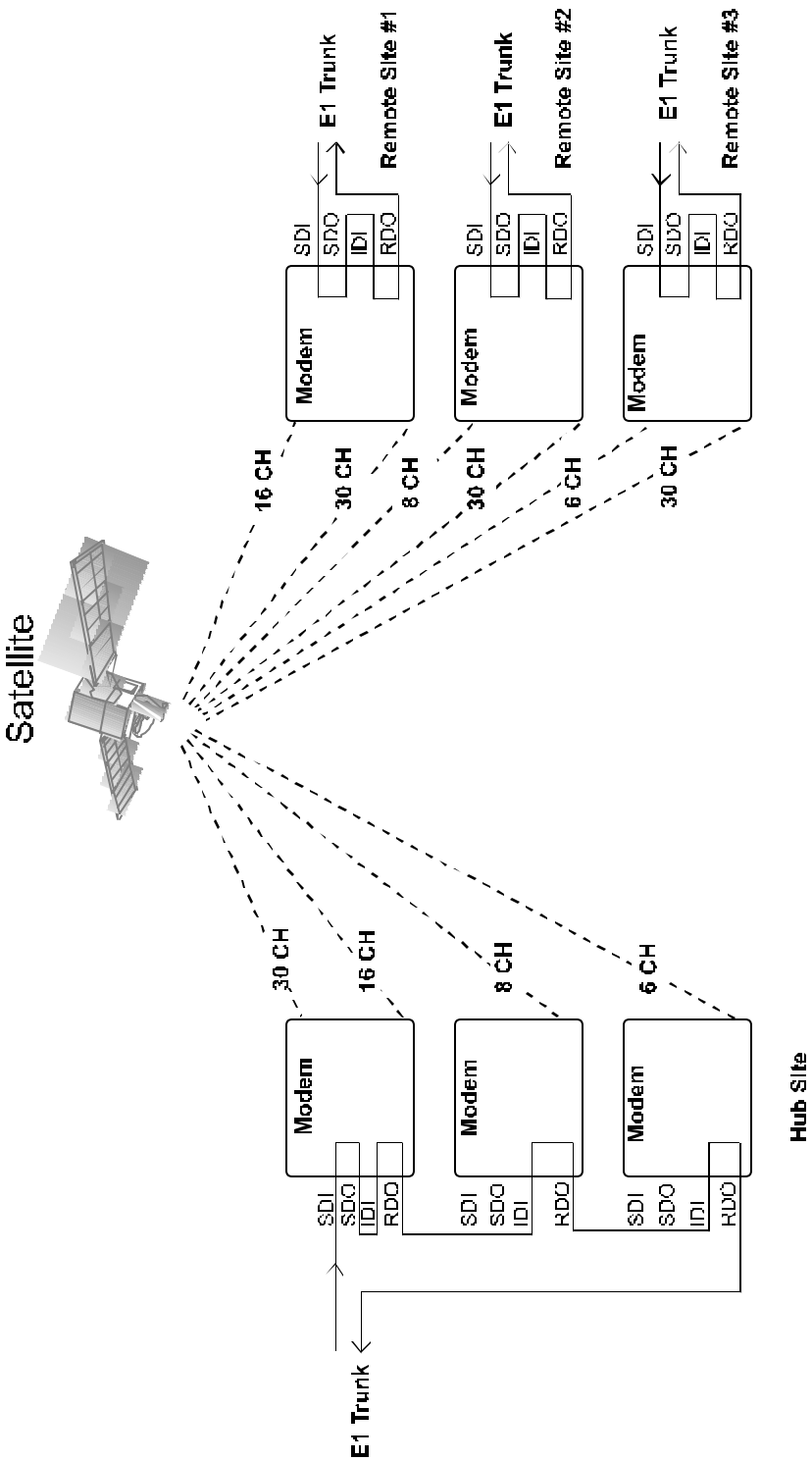


Figure 5-8. Multidestinational Communications

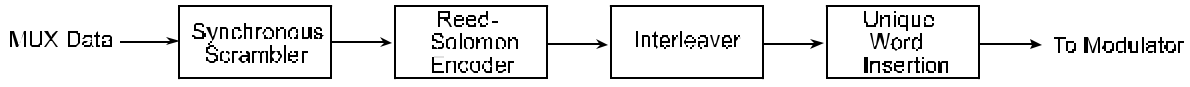


Figure 5-9. **Reed-Solomon Encoder Functional Block**

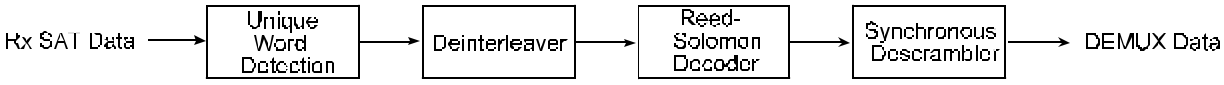


Figure 5-10. **Reed-Solomon Decoder Functional Block Diagram**

Table 5-1. Reed-Solomon Codes for IDR

Type of Service	Data Rate (Kbps)	RS Code (n, k, t)[1]	Bandwidth Expansion [(n/k) -1]	Interleaving Depth	Maximum[2] RS Codec Delay (ms)
Small IDR	64	(126, 112, 7)	0.125	4	115
(With 16/15 O/H)	128	(126, 112, 7)	0.125	4	58
	256	(126, 112, 7) (126, 112, 7)	0.125	4	29
	384	(126, 112, 7)	0.125	4	19
	512	(126, 112, 7) (126, 112, 7)	0.125	4	15
	768	(126, 112, 7)	0.125	4	10
	1024		0.125	4	8
	1536		0.125	4	5
IDR	1544	(225, 205,10)	0.0976	4	9
(With 96 Kbps O/H)	2048	(219, 201, 9)	0.0896	4	7
	6312	(194, 178, 8)	0.0899	4	2
	8448	(194, 178, 8)	0.0899	4	<2
	1544	(219, 201, 9)	0.0896	8	
8PSK	2048	(219, 201, 9)	0.0896	8	
	6312	(219, 201, 9)	0.0896	8	
	8448	(219, 201, 9)	0.0896	8	

NOTES:

1. n = code length, k = information symbols, and t = symbol error correcting capability.

2. Design objective.

Appendix A
RCS10 Redundant Communication System Technical Specifications

A.1 Introduction

This section defines the technical performance parameters and requirements for the RCS10 Redundant Communication System.

RCS10 Modem and Redundant Control System

System

Number of Modems: Up to ten (10) DMD10 modem modules. Back-up Modems: Up to two (2) DMD10 modems may be designated as backup modems.

Possible Redundancy

Configurations:	1 to 9 non-redundant modems
	One configuration, 1:1 through 1:9
	One configuration, 2:2 through 2:8
	Two independent 1:N configurations
Power:	Two independent AC power supplies

Modulator

Modulation:	BPSK, QPSK, (8PSK, OQPSK, Optional)
Data Rates:	9.6 Kbps to 8.448 Mbps, 1 bps steps
IF Tuning Range:	50 to 180 MHz in 1 Hz steps
IF Impedance:	75 ohms
IF Connector:	BNC (At RCS10 Back Panel)
IF Return Loss:	20 dB Minimum
Output Power:	-20 to + 5.0 dB in 0.1 dB steps
Output Stability:	$\pm$ 0.5 dB
Output Spectrum:	Meets IESS308/309 Power Spectral mask
Spurious:	< -55 dBc
On/Off Power Ratio:	> 60 dB
Scrambler:	CCITT V.35 or IBS (Others optional)
Encoder:	Viterbi, K=7 (Sequential optional)
Code Rates:	1/2, 3/4 and 7/8
Data Clock Source:	Internal or External
Internal Stability:	$\pm$ 1 X 10^{-5}

Demodulator

Demodulation:	BPSK, QPSK (8PSK, OQPSK optional)
Data Rates:	9.6 Kbps to 8.448 Mbps, 1 bps steps
IF Tuning Range:	50 to 180 MHz in 1 Hz steps
IF Impedance:	75 ohms
IF Connector:	BNC (at RCS10 Back Panel)
IF Return Loss:	20 dB Minimum

Spectrum:	INTELSAT IESS-308/309 Compliant
Signal Input Range:	-45 dBm ±10 dB
Adjacent Channel	
Rejection Ratio:	> +14 dBc
Absolute Maximum	
Total Input Power:	Maximum Composite Power
Decoder:	Viterbi, K=7 (Sequential optional)
Code rates:	1/2, 3/4, and 7/8 Rate
Descrambler:	CCITT V.35 or IBS (Others optional)
Time for 90%	<2 seconds for data rates > 512 Kbps
Probability of Lock:	<10 seconds for data rates < 512 Kbps
Acquisition Range:	Programmable ± 1 KHz to ±42 KHz
Sweep Delay Value:	100 msec to 299.9 sec. 100 msec. steps

DMD10 Modem BER Performance

BER vs. E_b/N_o	**Guaranteed E_b/N_o (dB)**	
	Rate 1/2 FEC	**Rate 3/4 FEC**
10^{-3}	4.2	5.3
10^{-6}	6.1	7.6
10^{-7}	6.7	8.3
10^{-8}	7.2	8.8
10^{-10}	9.0	10.3

Plesiochronous Buffer

Size:	2 Kbits to 256 Kbits
Centering:	Automatic on Underflow/Overflow
Centering Modes:	IBS: Integral Number of Frames
	IDR: Integral Number of Multiple-Frames
Clock:	Transmit clock bit rate, External BNC input clock, recovered demodulator clock, or SCT clock.

Monitor and Control

Signals that are monitored and/or controlled from the front panel or remotely using the RS485 or Ethernet Remote Port.

Transmit and Receive Frequencies

Transmit and Receive Data Rates

Transmit and Receive Code Rate

Differential Encoding On/Off

Scrambler On/Off, IBS or V.35 Mode, Others

Spectrum Normal/Inverted

Clock Source, Polarity and Frequency

Transmit Carrier On/Off

Transmit Carrier Level

CW, Dual, or Offset

Demodulator Input Level

Eb/No, BER, Corrected BER

Buffer Size, Clock, Center Buffer

Event Buffer

Faults

Sweep Range and Delay

IDR/IBS Backward Alarms, Modem/Switch Alarms

IDR/IBS Framing, Drop and Insert Mode and Flags

Loopback; Terrestrial, Satellite, both or none-interface

Redundancy Switch Auto/Manual, Backup Delay

Environmental

Prime Power:	100 - 240 Vac, 7 A, 50-60 Hz, 450 Watts
Operating Temp.:	0 to 50° C, 95% humidity, non-condensing
Storage Temp.:	-20 to 70° C, 99% humidity, non-condensing

Physical

Weight (fully-loaded):	100 pounds (45.45 kg.)
Size:	17.25 x 19 x 19 inches
	(44.45 x 48.26 x 48.26 cm.)
Shipping Weight:	120 pounds (54.54 kg.)
Shipping Size:	26 x 25 x 24 inches (65 x 63 x 60 cm.)

DMD10 Drop and Insert

Terrestrial Data:	T1 (1.544 Mbps) or E1 (2.048 Mbps) G.732/733 format
Line Coding:	AMI or B8ZS for T1 and HDB3 for E1
Framing:	D4 or ESF for T1 and PMC30 (30 channels) or PMC31 (31 channels) for E1
Time Slot Selection:	n x 64 contiguous or arbitrary blocks for Drop or Insert; Drop TS16.
Data Rates:	64, 128, 256, 384, 512, 768, 1024, 1,536, and 1,920 Kbps

Reed-Solomon Codec

An optional Intelsat-compliant Reed-Solomon codec is available for the DMD10 modem. The composite data rate Eb/No, performance for Reed-Solomon outer coding with inner convolutional encoding and Viterbi decoding is:

BER vs. Eb/No	Guaranteed Performance	
	Rate 1/2 FEC	Rate 3/4 FEC
10^{-6}	4.1	5.6
10^{-7}	4.2	5.8
10^{-8}	4.4	6.0
10^{-10}	5.0	6.3

External Clock Distribution Module

The clock distribution module has one clock input and nine clock driver outputs that are distributed to the DMD10 modem modules.

Input:	BNC
Clock Rates:	256 KHz to 10 MHz, in 8 KHz steps, normally set at 1.0, 1.544, 2.048. 5.0, or 10 MHz.

The external reference module has one IF reference input that is distributed to DMD10 modems

Input:	BNC
Frequencies:	1, 5, 10, 20 MHz

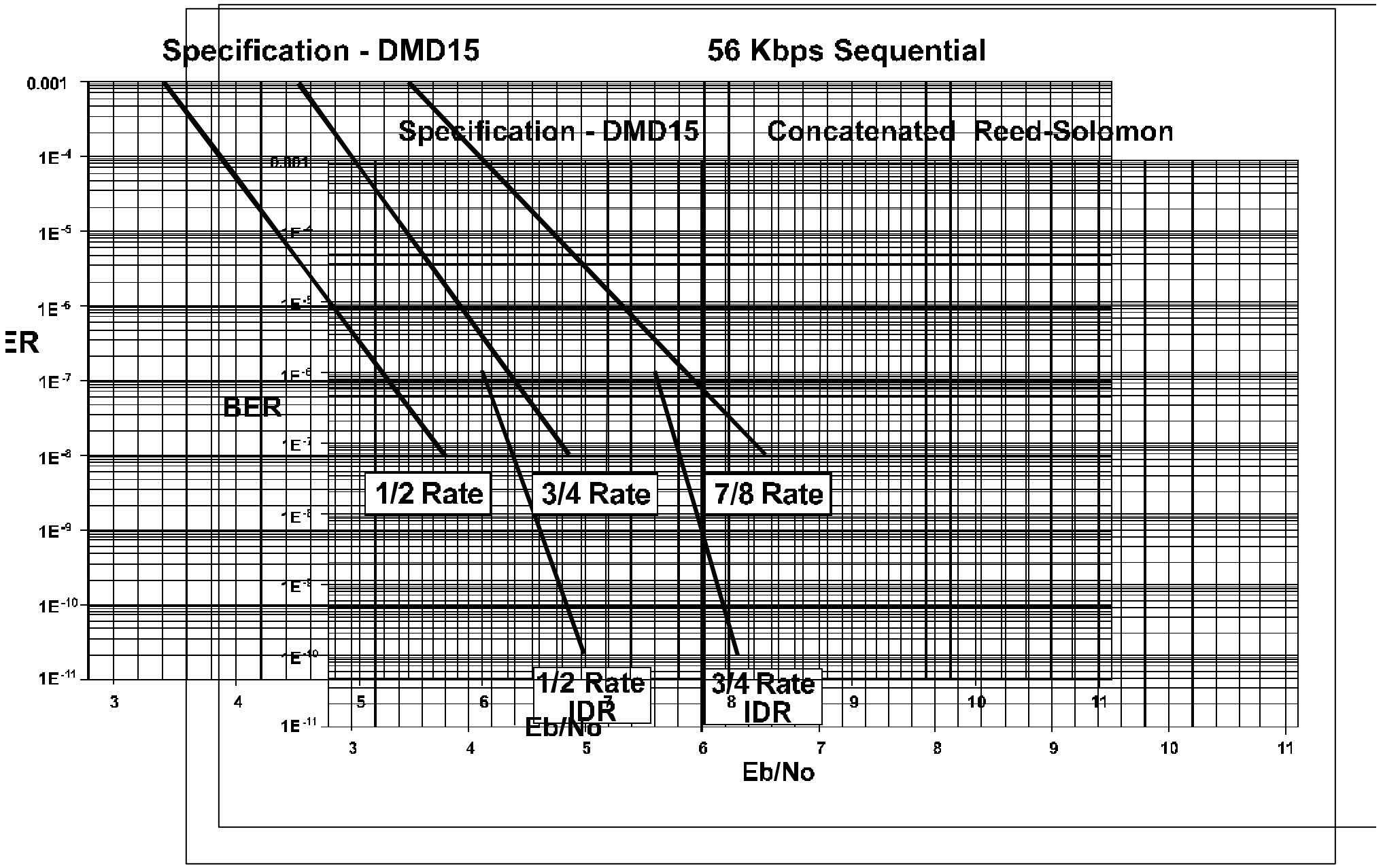
Internal High Stability Clock

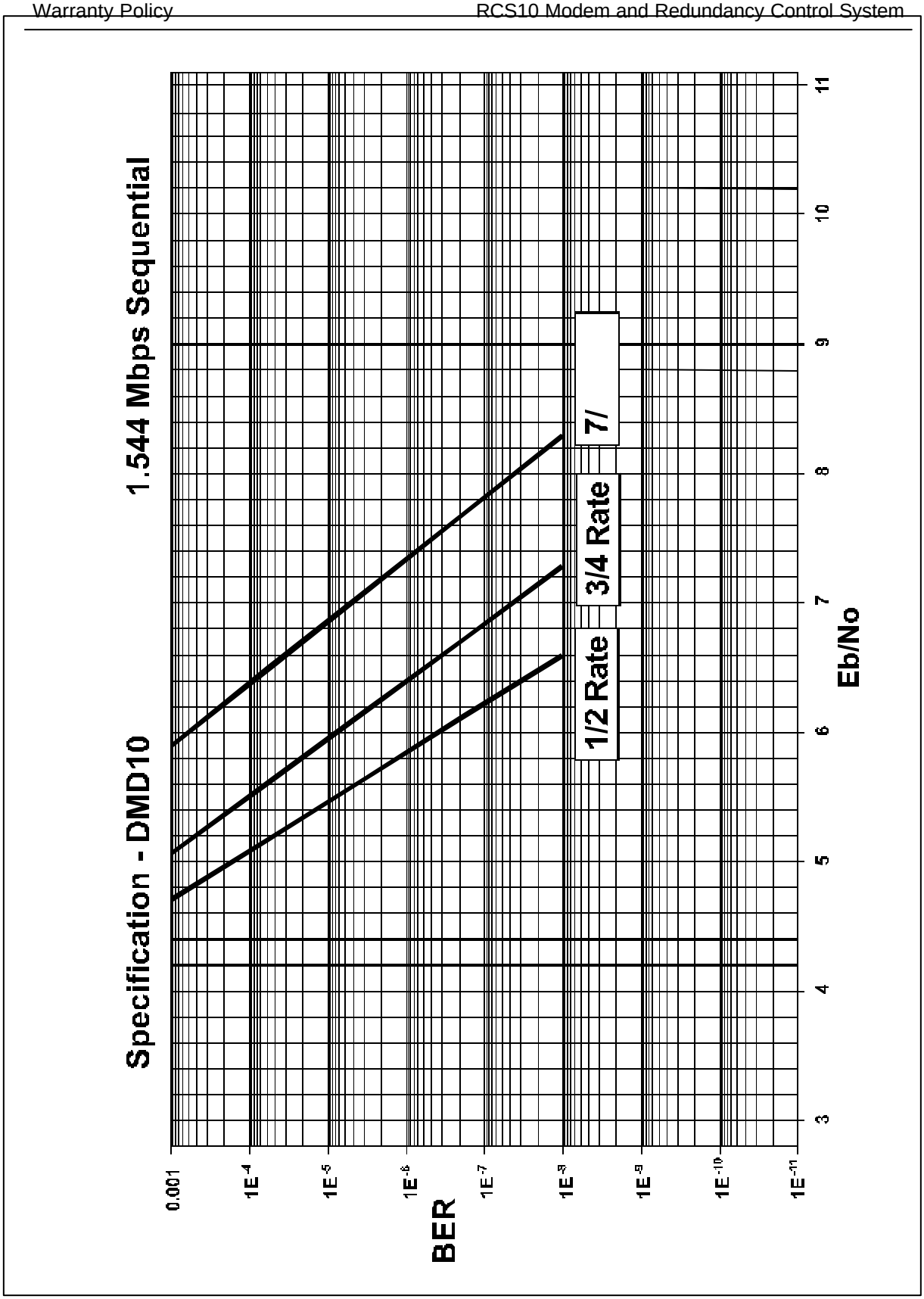
Internal High Stability Clock: Optional 10^{-7}

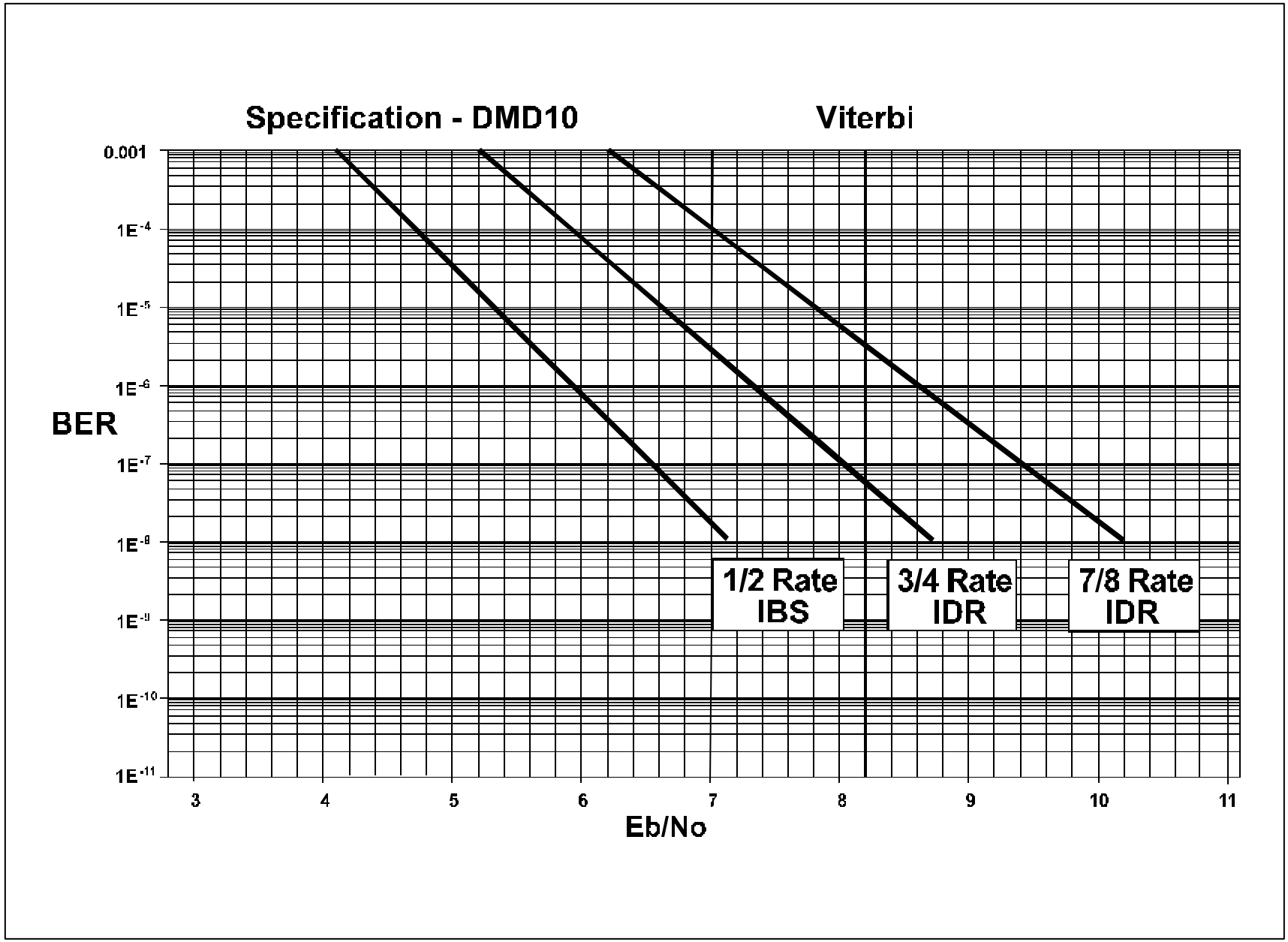
Terrestrial Interfaces

A variety of standard interfaces are available for the RCS10 System. The total maximum number of interfaces is nine.

T1 (DSX1)	1.544 Mbps, 100 ohm balanced (AMI or B8ZS)
E1 (G.703)	2.048 Mbps, 75 ohm BNC unbalanced or 120 ohm balanced (HDB3)
T2 (DSX2)	6.312 Mbps, 75 ohm BNC unbalanced (B6ZS) or 110 ohm balanced (B8ZS)
E2 (G.703)	8.448 Mbps, 75 ohm BNC unbalanced (HDB3)
ITU V.35	All Data Rates, Clock/Data, DCE
RS 422/449	All Data Rates, Clock/Data, DCE


Specification - DMD15
56 Kbps Sequential
Specification - DMD15
Concatenated Reed-Solomon
BER
1/2 Rate
3/4 Rate
7/8 Rate
1/2 Rate IDR
3/4 Rate IDR
Eb/No
Eb/No


Specification - DMD10
1.544 Mbps Sequential
BER
0.001
1E-4
1E-5
1E-6
1E-7
1E-8
1E-9
1E-10
1E-11
3
4
5
6
7
8
9
10
11
Eb/No
1/2 Rate
3/4 Rate
7/


Specification - DMD10
Viterbi
0.001
1E-4
1E-5
1E-6
BER
1E-7
1E-8
1E-9
1E-10
1E-11
1/2 Rate
IBS
3/4 Rate
IDR
7/8 Rate
IDR
3
4
5
6
7
8
9
10
11
Eb/No

DMD10 - 8PSK With Viterbi Decoder

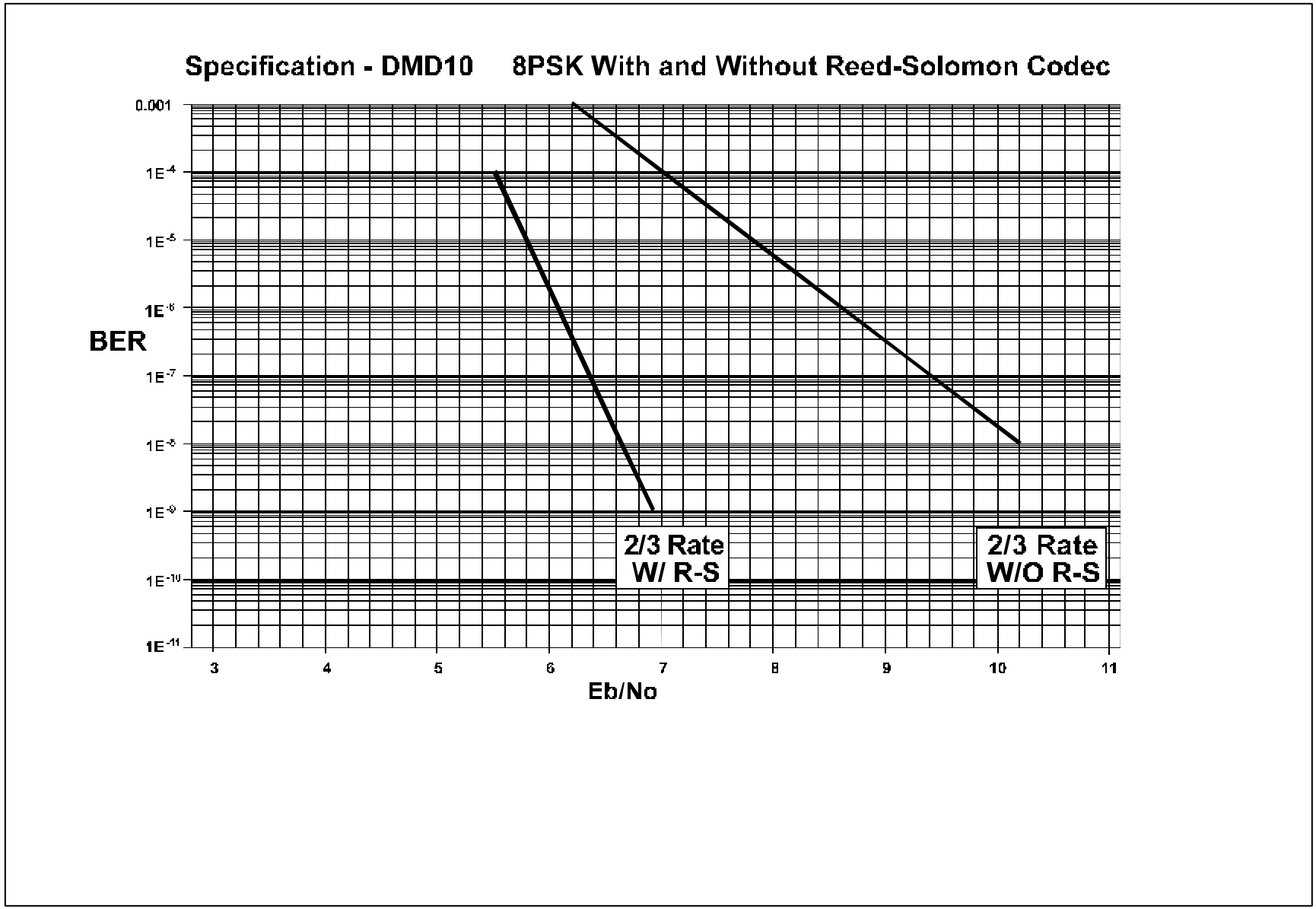
BER	Specification 8PSK 2/3 Rate	Typical 8PSK 2/3 Rate
10^{-3}	6.2 dB	5.6 dB
10^{-4}	7.0 dB	6.4 dB
10^{-5}	7.8 dB	7.2 dB
10^{-6}	8.7 dB	8.1 dB
10^{-7}	9.5 dB	8.9 dB
10^{-8}	10.2 dB	9.7 dB

(Refer to BER Curve Figure On Page A-12)

DMD10 - Viterbi Decoder and Reed-Solomon

BER	Specification 8PSK 2/3 Rate	Typical 8PSK 2/3 Rate
10^{-4}	5.5 dB	5.1 dB
10^{-5}	5.8 dB	5.4 dB
10^{-6}	6.2 dB	5.6 dB
10^{-7}	6.5 dB	5.8 dB
10^{-8}	6.7 dB	6.1 dB
10^{-9}	6.9 dB	6.3 dB

(Refer to BER Curve Figure On Page A-12)


Specification - DMD10 8PSK With and Without Reed-Solomon Codec
BER
0.001
1E-4
1E-5
1E-6
1E-7
1E-8
1E-9
1E-10
1E-11
3
4
5
6
7
8
9
10
11
Eb/No
2/3 Rate W/ R-S
2/3 Rate W/O R-S

RCS10

Modem and

Redundancy Communication System

Addendum Sheet for TM058 – Rev. 2.3

Rev. 2.0

April, 2001

- NOTICE -

RADYNE COMSTREAM

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All information regarding Warranties and Service, Warranty Period, Warranty Coverage Limitations, Warranty Replacement and Adjustment, Liability Limitations, Warranty Period, Warranty Repair Return Procedures, and Non-Warranty Repair is covered under the technical manual for which this addendum applies.

Radyne ComStream Corporation

3138 E. Elwood St.

Phoenix, Arizona 85034 (USA)

ATTN: Customer Support

Phone: (602) 437-9620 Fax: (602) 437-4811

RCS10 Modem and Redundancy Control System

Addendum Sheet

TM083 – Record of Revisions

Radyne ComStream Corporation is constantly improving its products and therefore the information in this document is subject to change without prior notice. Radyne ComStream Corporation makes no warranty of any kind with regard to this material, Including but not limited to the implied warranties of merchantability and fitness for a particular purpose. No responsibility for any errors or omissions that may pertain to the material herein is assumed. Radyne ComStream Corporation makes no commitment to update nor to keep current the information contained in this document. Radyne ComStream Corporation assumes no responsibility for use of any circuitry other than the circuitry employed in Radyne ComStream Corporation systems and equipment.

Revision Level	Date	Reason for Change
1.0	11-15-00	New Release.
2.0	4-30-01	Added the Following Sections: Turning On/Off the Fairchild Compatible Scrambler/Descrambler; Swapping the Symbol for BPSK; Storing and Recalling 5 Configurations; DMD10 I & Q Ports.

3.4.1 Description

(Paragraph 3) Delete the following sentence:

Modems not part of a backup pool will not be learned.

3.4.6 Configuration Copy

The Configuration Copy is a feature that enables a user to store/retrieve up to five modem and interface card configurations in non-volatile memory. These are in addition to the current running configuration.

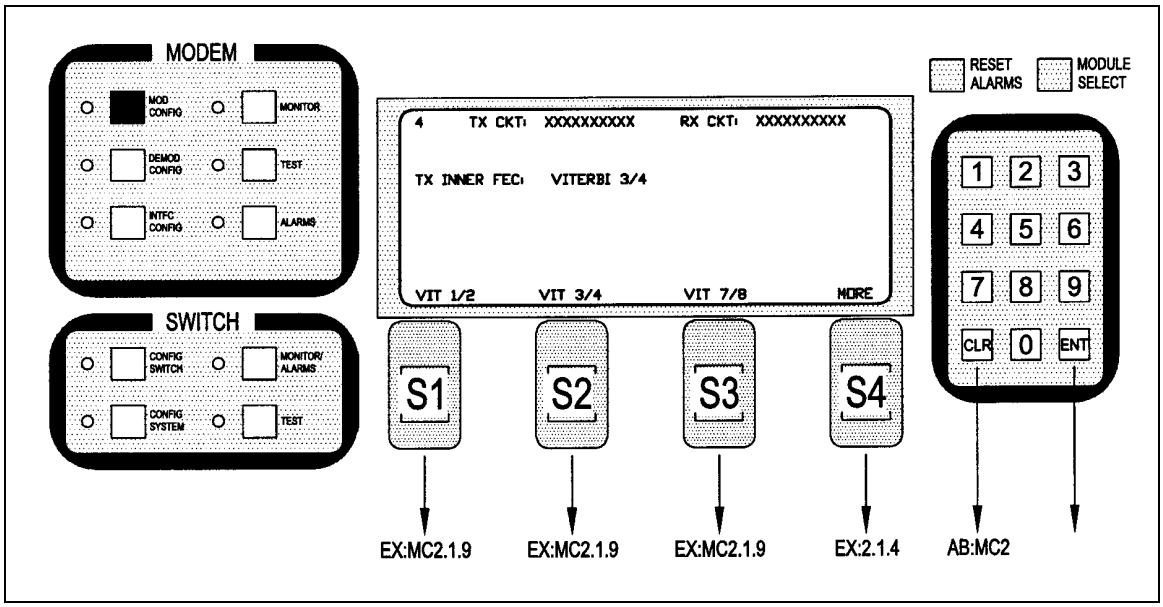
The interface card configurations are tagged to the slot, and are stored in the switch. The modems, on the other hand hold their own settings. The user can copy from and copy to any configuration in memory including the current running configuration. Source and destination configurations must be different.

When instructed to copy a configuration, the switch sends a command to the modem to copy the configuration, and if successful, the switch updates the slot configurations as well. If the destination configuration is the current configuration, the modem re-initializes itself and uses the new settings. The switch interface card is only updated when the destination configuration is the current configuration.

A user must be careful not to copy onto the current configuration unless that is desired, interruptions in traffic will occur.

3.9.1 Function Keys

MC2.1 - Modified as follows:

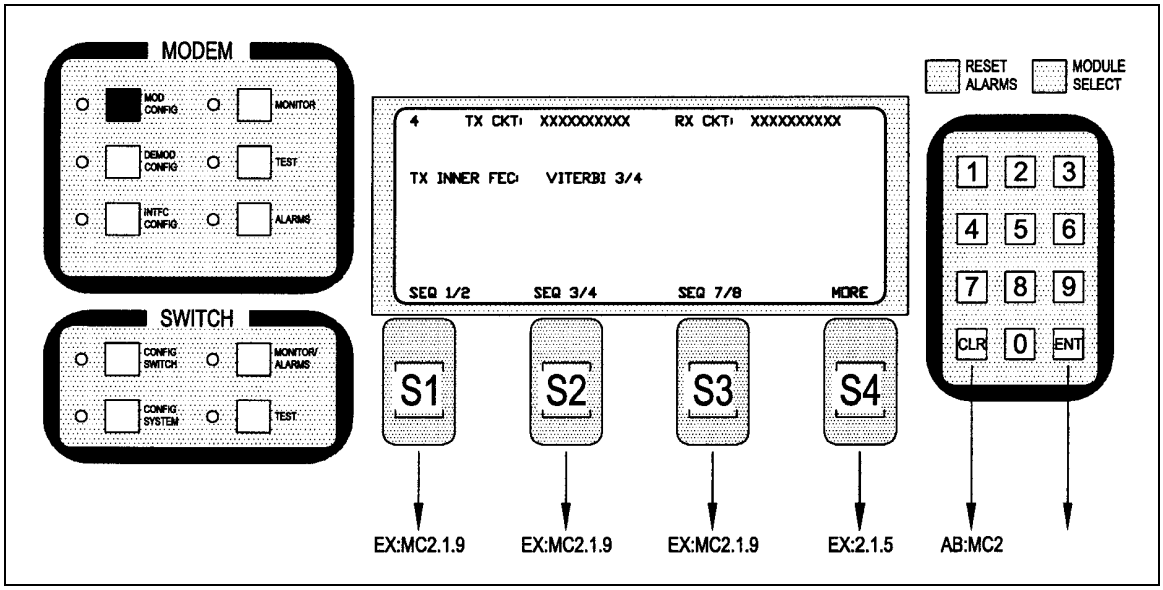


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

MC2.1.4 - Modified as follows:

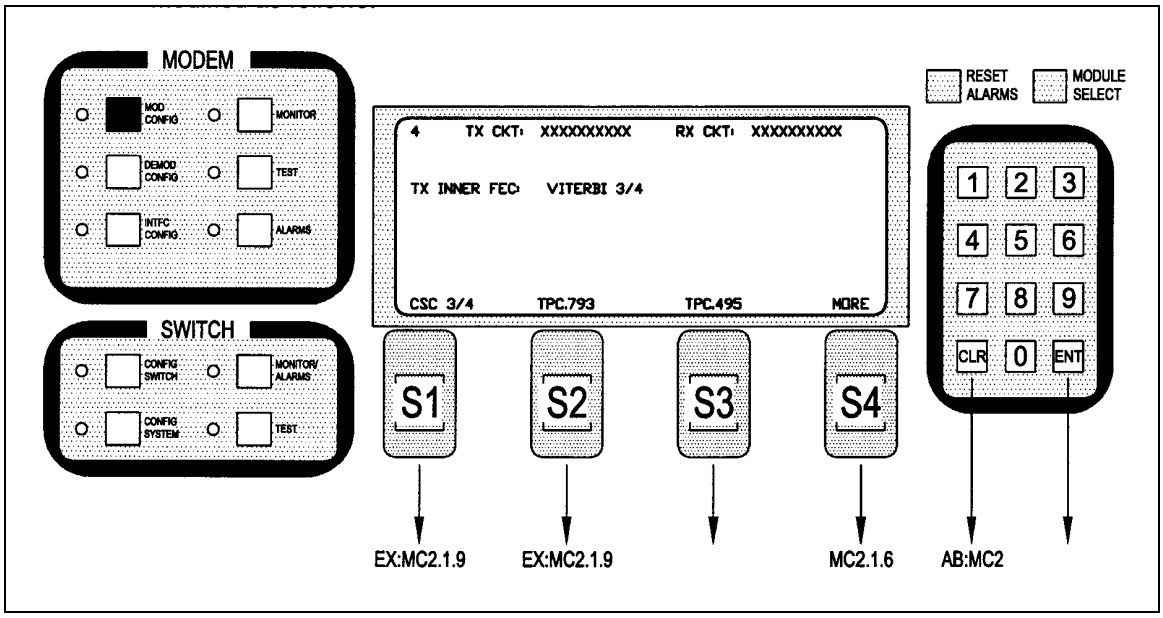


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

MC2.1.5 – Modified as follows:

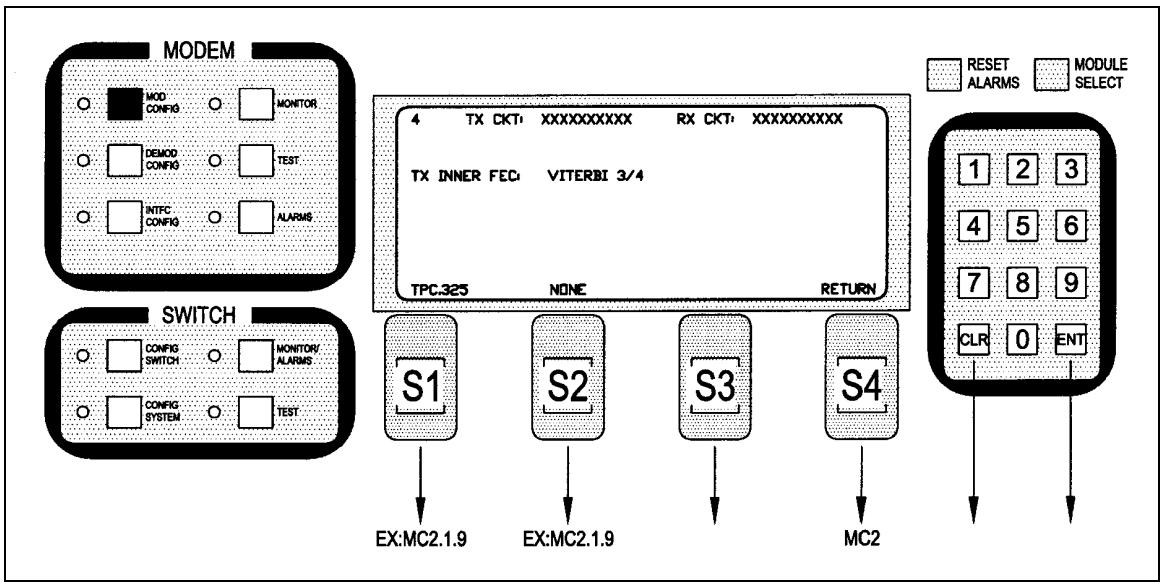


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

MC2.1.6– Added after Screen MC2.1.5 as follows:

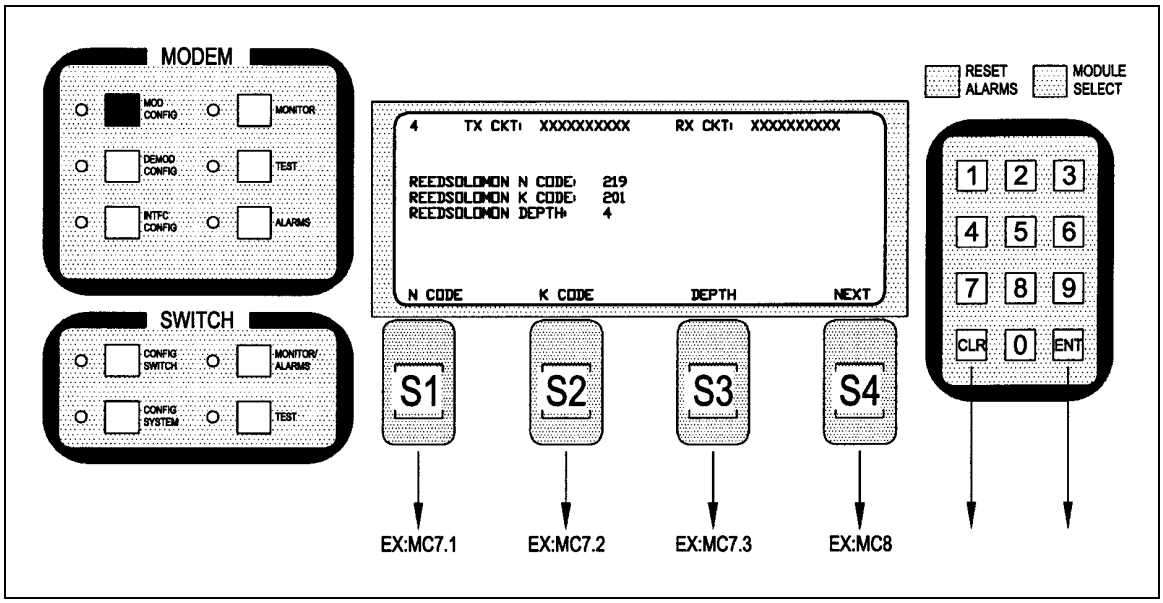


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

MC7 – Modified as follows:



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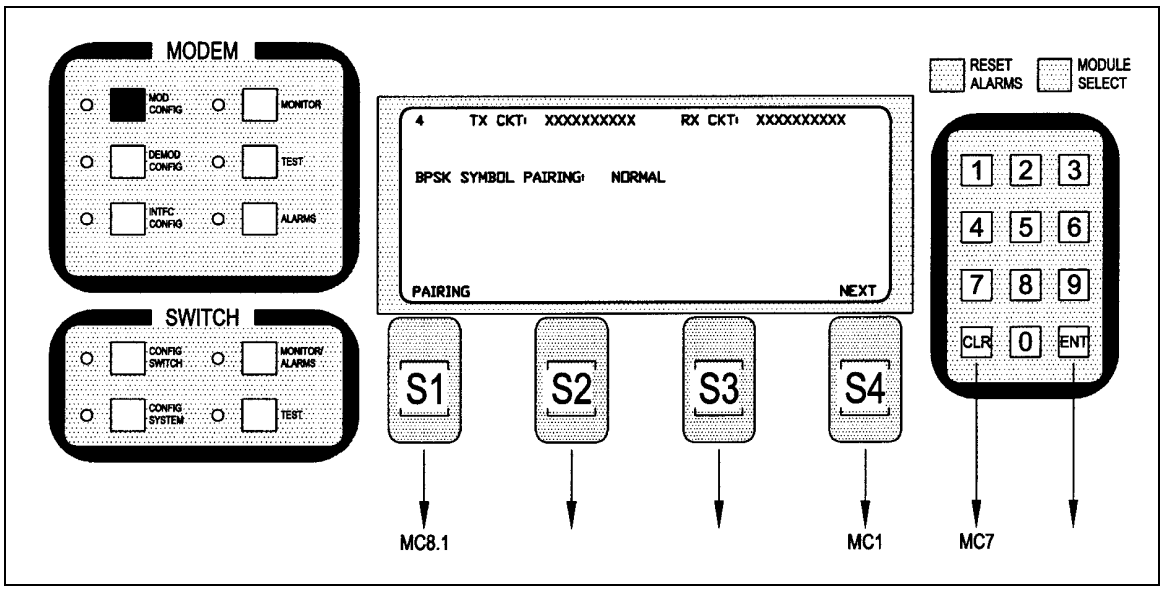
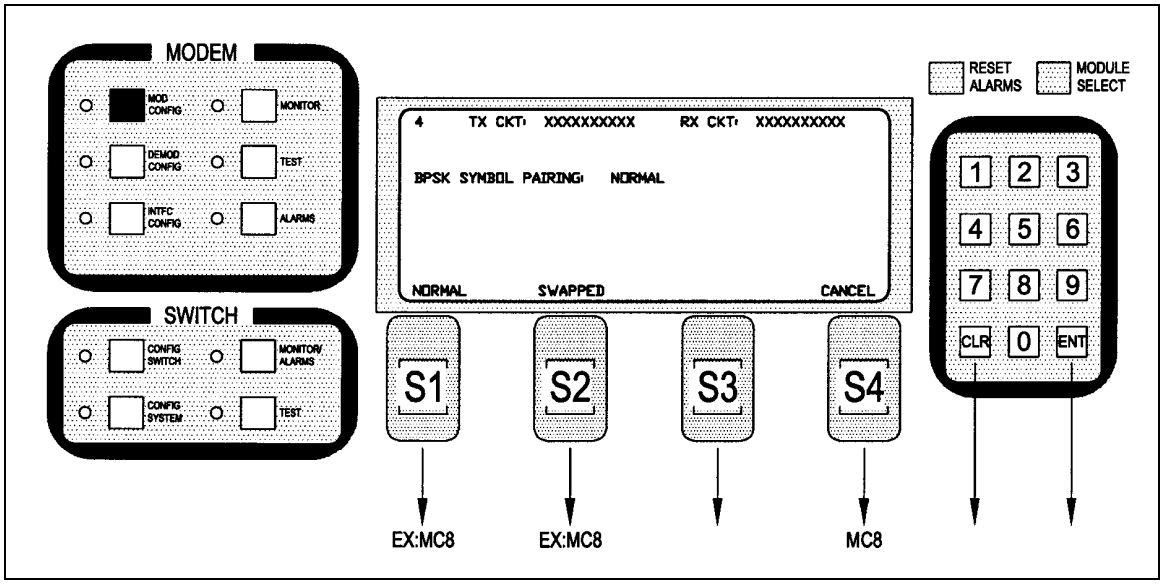
MC8 – Added after Screen MC7.3 as follows:



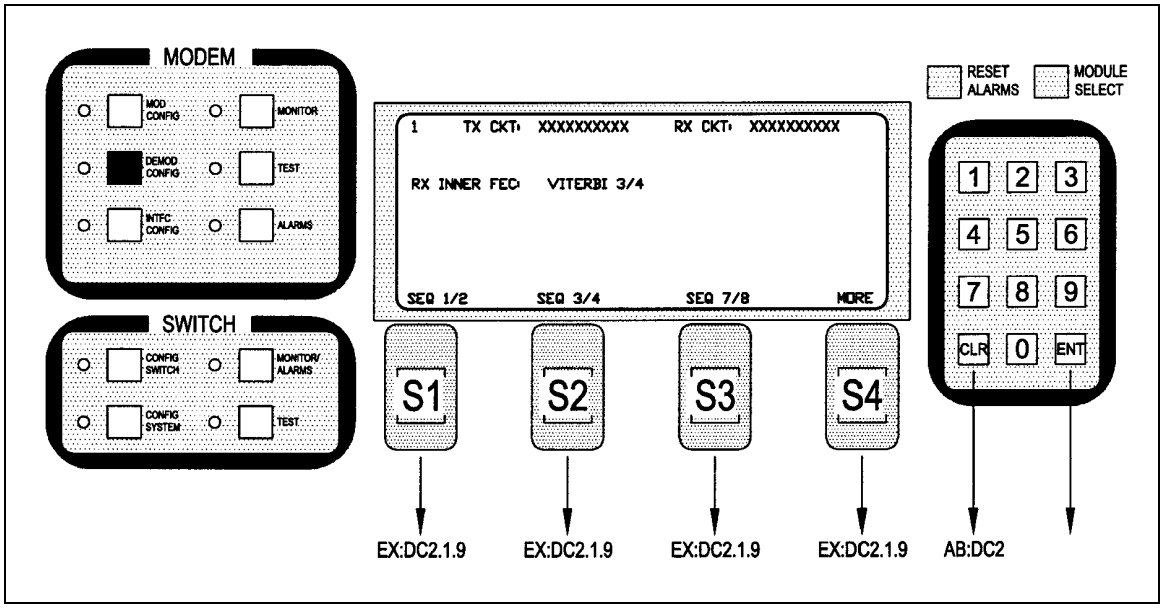
Note: BPSK Symbol Pairing Selection will only be displayed if BPSK Modulation is selected.

MC8.1 – Added after Screen MC8 as follows:



Note: BPSK Symbol Pairing Selection will only be displayed if BPSK Modulation is selected.

DC2.1.4 – Modified as follows:

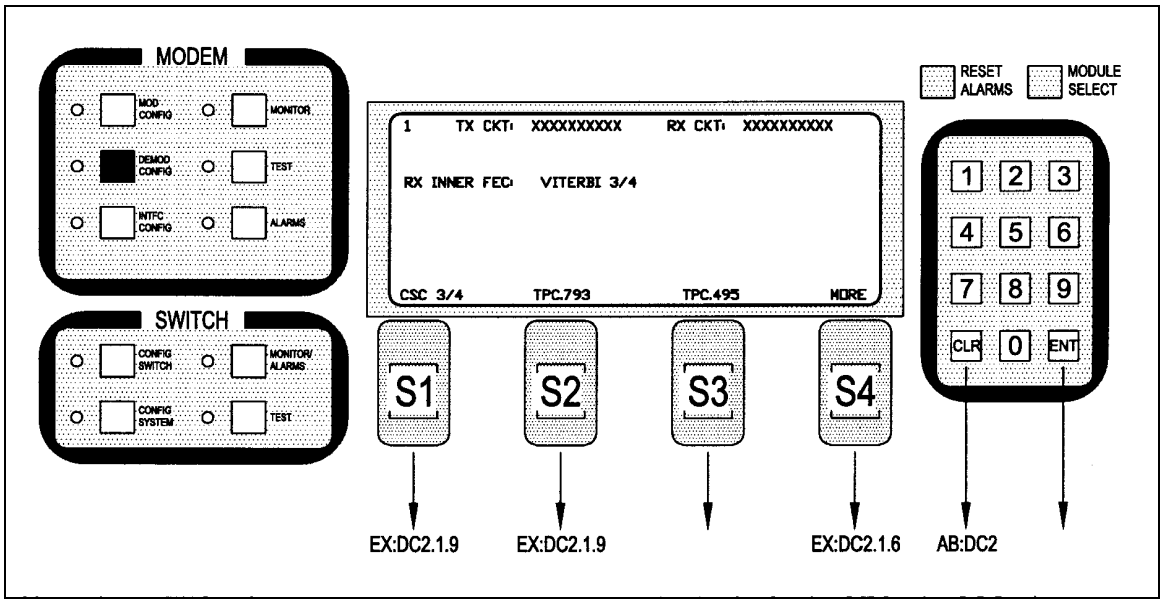


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793, TPC.495, TPC.325

CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

DC2.1.5 – Modified as follows:

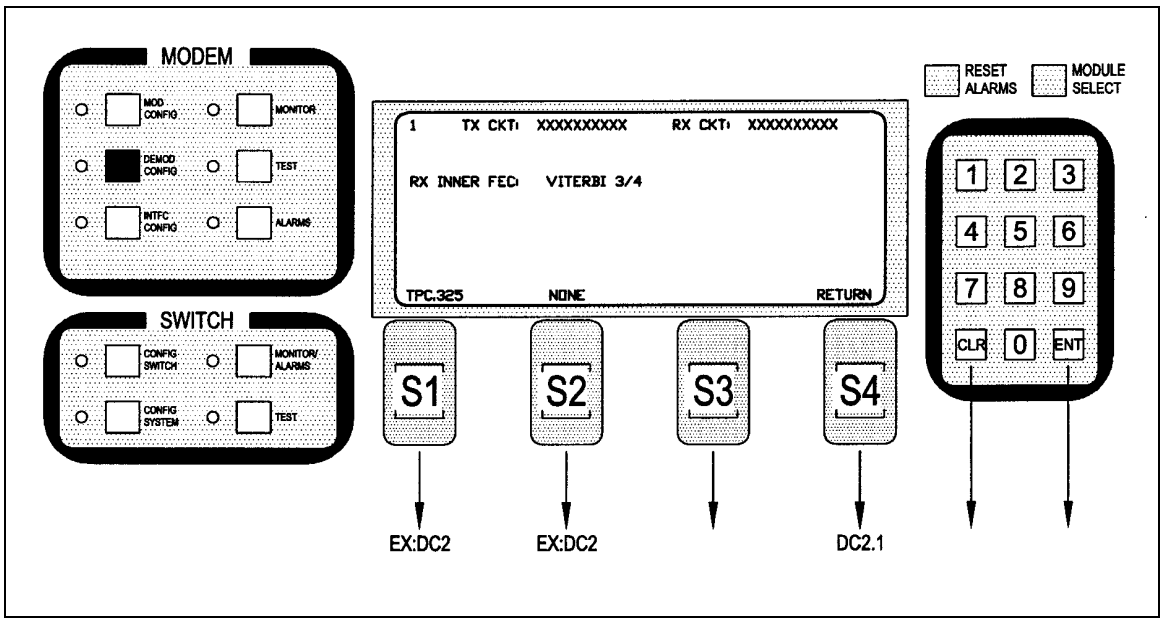


Note: Inner FEC – Select VIT 1/2, VIT 3/4, VIT 7/8, SEQ 1/2, SEQ 3/4, SEQ 7/8, CSC 3/4, NONE, TPC.793

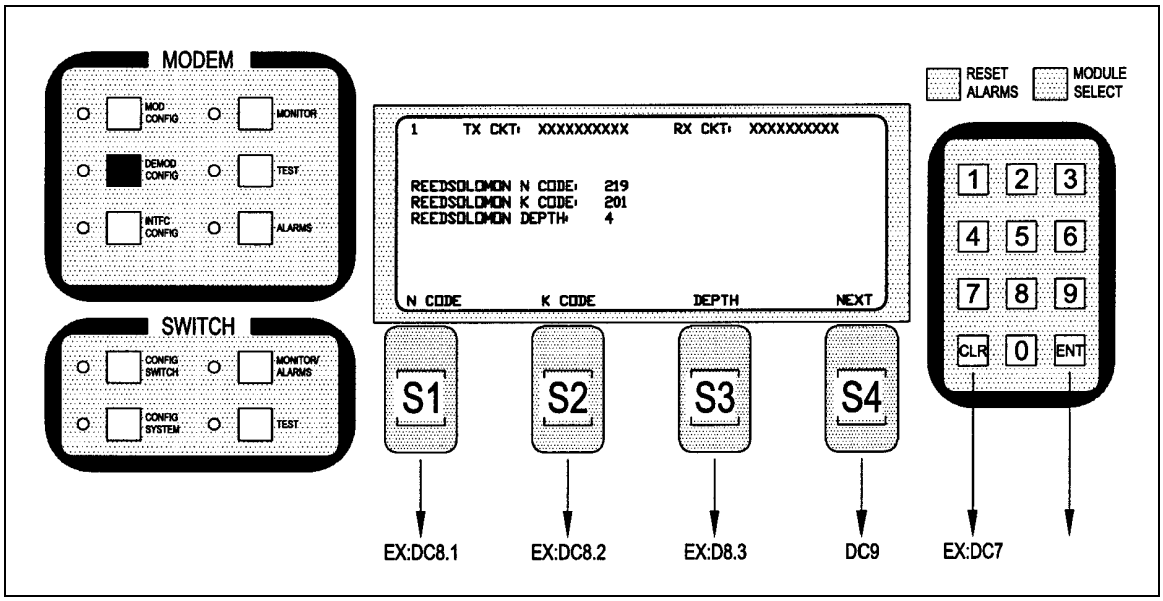
CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

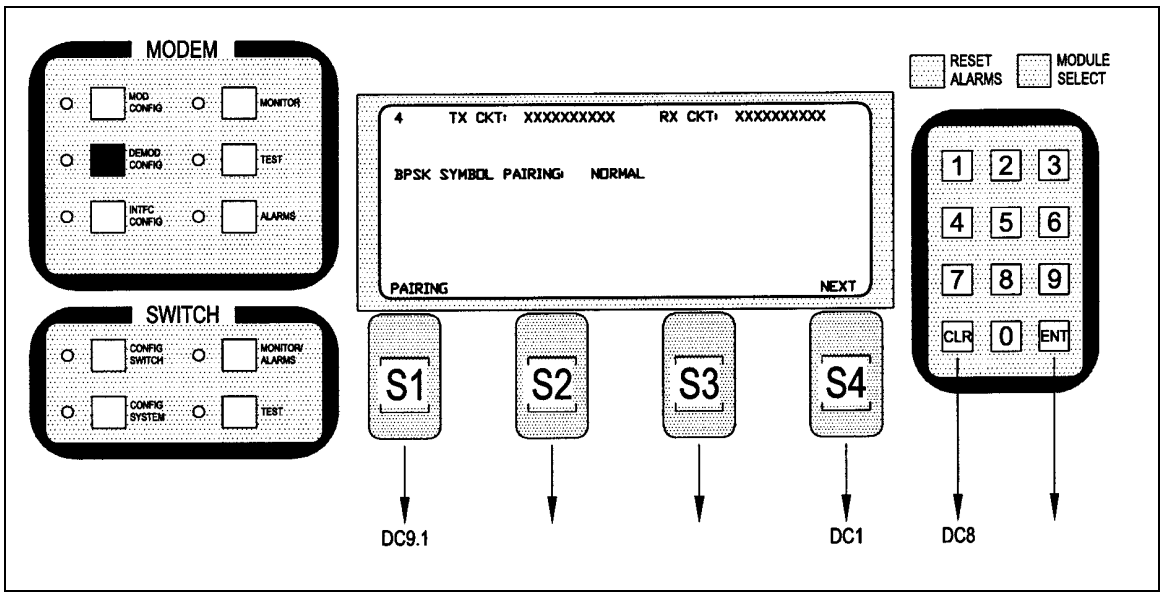
DC2.1.6 – Added after Screen DC2.1.5 as follows:



DC8 – Modified as follows:



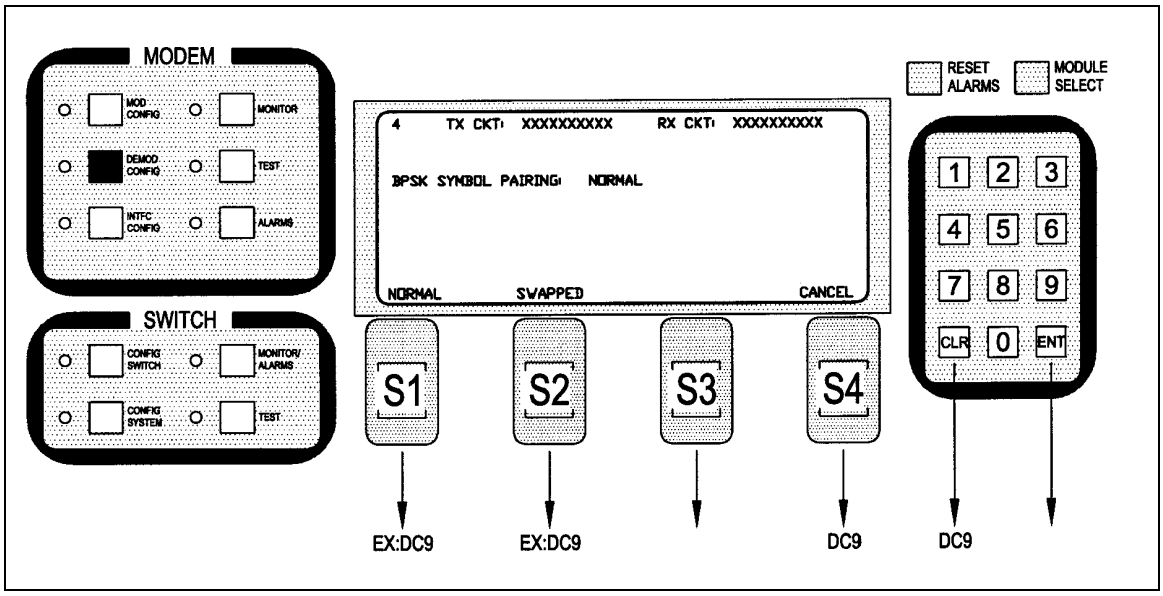
DC9 – Added after Screen DC8.3 as follows:



CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

TPC = Turbo Codec

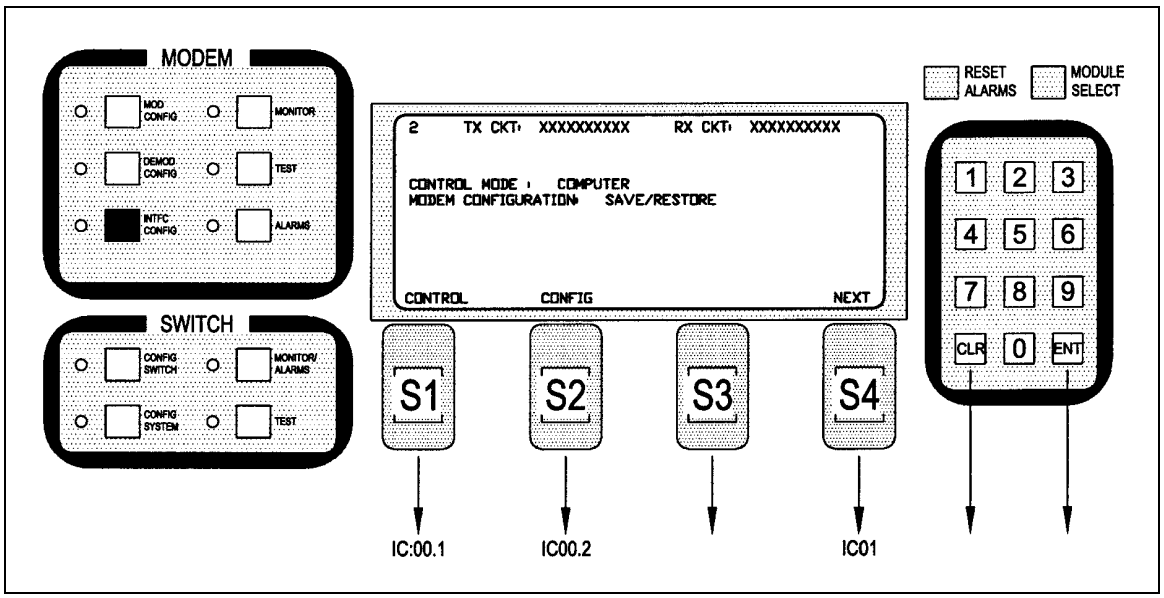
DC9.1 – Added after Screen DC9 as follows:



CSC 3/4 = ComStream 3/4 Rate Sequential Compatible Mode

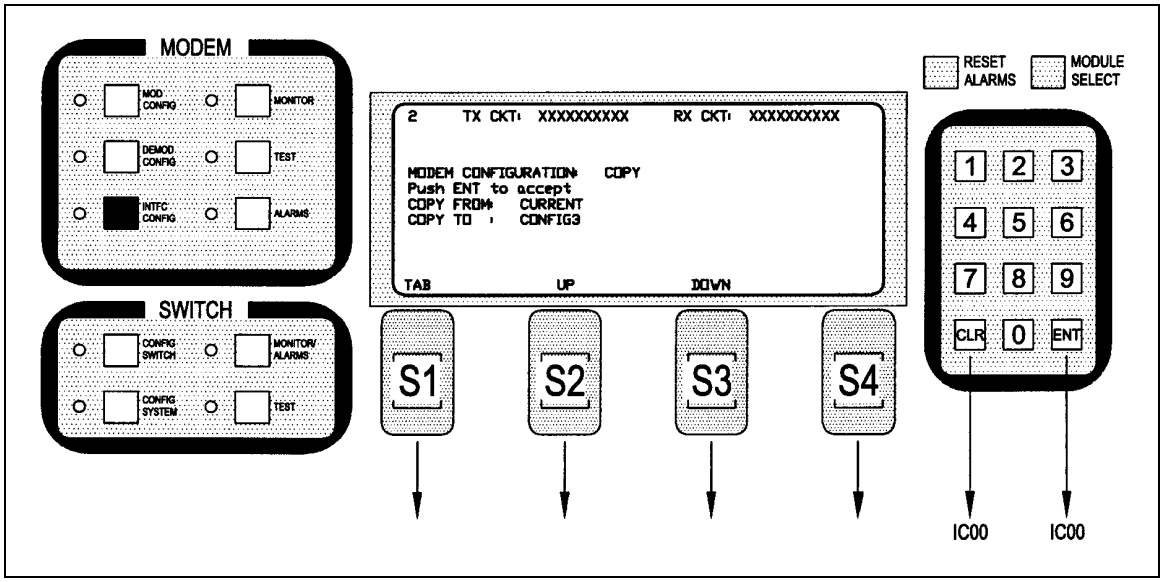
TPC = Turbo Codec

IC00 – Modified as follows:



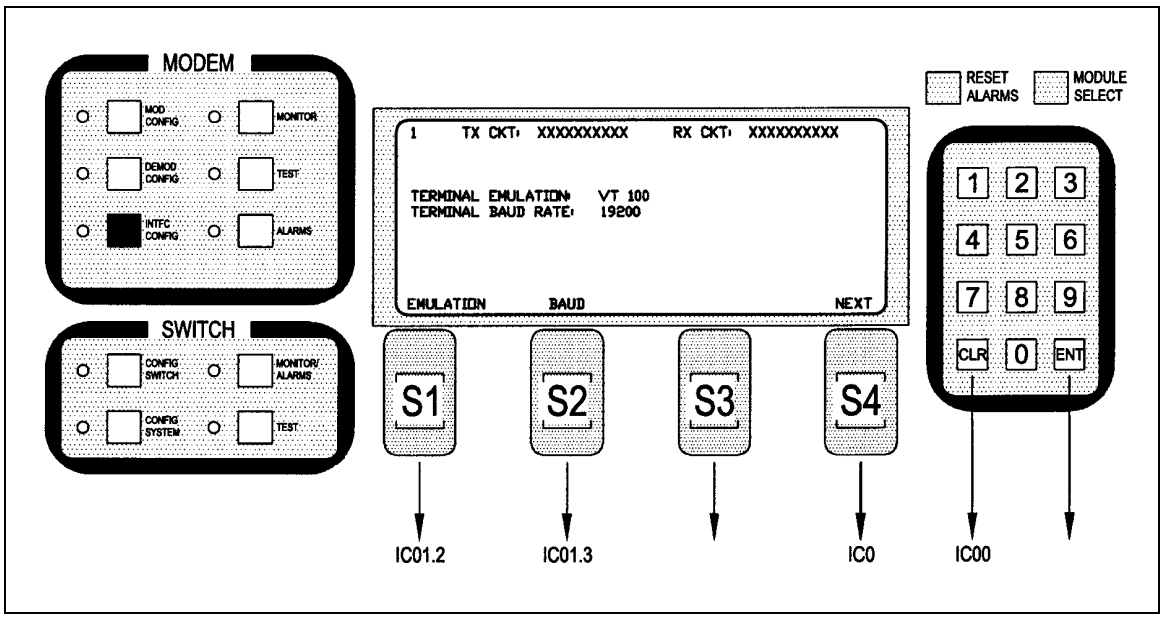
Note: Select Modem Control Mode or Configuration Copy Feature. Up to five configurations can be stored/retrieved.

IC00.2 – Added after Screen IC00.1 as follows:

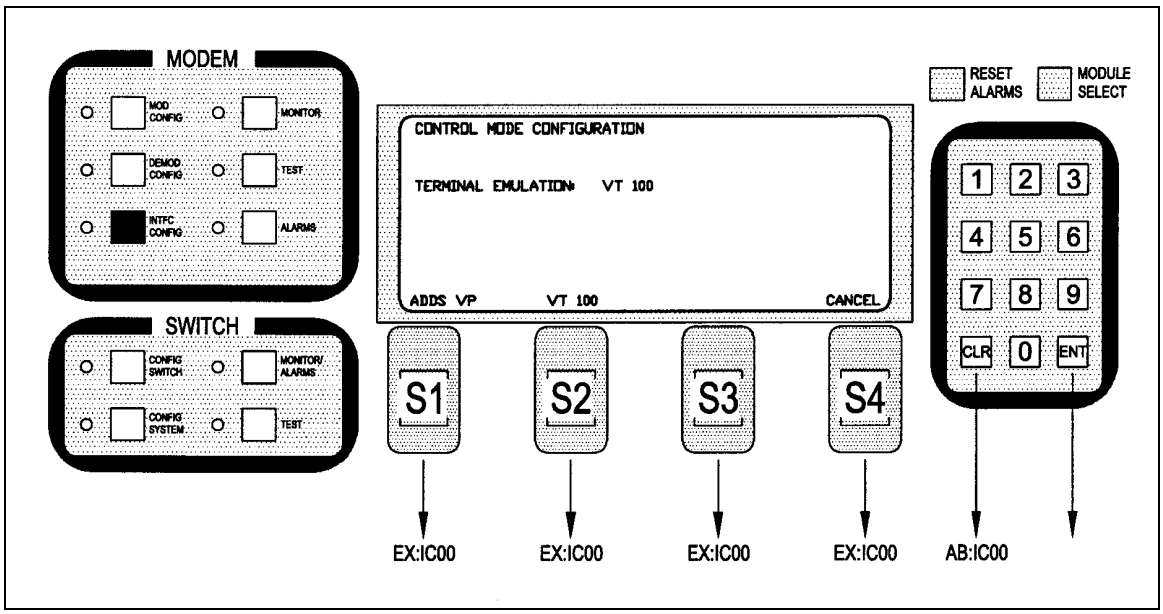


Note: Up to five configurations, in addition to the current settings, can be stored/retrieved.

IC01 – Added after Screen IC00.2 as follows:



IC00.2 – Changes its name to IC01.2 and is modified as follows:



IC00.3 – Changes its name to IC01.3.

IC00.4 – Changes its name to IC01.4.

IC00.5 – Changes its name to IC01.5.

B.1.4 Global Response Operational Codes

Change the last Modem Response Error Codes Description and Opcode of the first group to MPARM_AUPCDEFPOWER_ERROR 0x43F.

Add the following Modem Response Error Code Descriptions and Opcodes to the bottom of the first group (following MPARM_AUPCDEFPOWER_ERROR 0x43F):

MPARM_CONFIGURATIONSOURCE_ERROR	0x440
MPARM_CONFIGURATIONDESTINATION_ERROR	0x441
MPARM_CONFIGURATION_ERROR	0x442

B.2 Remote Port Packet Structure

Modulator Opcode <2400H>

Change <1> Convolutional Encoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Modulator Opcode <2607H>

Change <1> Convolutional Encoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Demodulator Opcode <2401H>

Change <2> Sweep Delay to:

(Binary value, 0.1 second steps. Reserved)

Change <1> Convolutional Decoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Change <1> Alarm 5 Masks to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Change Status Bytes <1> Alarm 5 to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Add to the end of Status Bytes:

<1> Spare

<4> Symbol Rate (Binary Value, 1bps steps)

Demodulator Opcode <240CH>

Change Status Bytes <1> Alarm 5 to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Add to the end of Status Bytes:

<1> Spare

<4> Symbol Rate (Binary Value, 1bps steps)

Demodulator Opcode <2409H>

Change <2> Sweep Delay to:

(Binary value, 0.1 second steps. Reserved)

Change <1> Convolutional Decoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Change <1> Alarm 5 Masks to:

(Bit 0 = Trellis Decoder Lock, Bit 1 = FM DSP Lock Mask, Bit 2 = T1 signaling fault, Bit 3 = Turbo Codec lock fault, Bits 4 – 7 = Spares)

Demodulator Opcode <2A08H>

Change <1> Convolutional Decoder (18 =… to:

18 = Trellis 8/9 Rate, 19 = Comstream SEQ 3/4 rate 20 = TPC.793 2D, 21 = TPC.495 3D, 22 = TPC.325 3D)

Add to the end of Demodulator Opcodes:

Opcode: <2C0BH> Command modem terminal emulation

<1> Emulation Mode (0 = Add viewpoint, 1 = VT 100, 2 = WYSE50)

Opcode: <2C0CH> Command modem terminal baud rate

<1> Baud Rate (0 = 300 baud, 1 = 600 baud, 2 = 1200 baud, 3 = 2400 baud, 4 = 800 baud, 5 = 9600 baud, 6 = 19200 baud, 7 = 38400 baud)

Opcode: <2C0DH> Command modem configuration copy

<1> Source Configuration (0 = current, 1 = configuration 1, 2 = configuration 2, 3 = configuration 3, 4 = configuration 4, 5 = configuration 5)

<1> Destination Configuration (0 = current, 1 = configuration 1, 2 = configuration 2, 3 = configuration 3, 4 = configuration 4, 5 = configuration 5)

Note: Source and destination configuration configurations must be different. Error 0x441 will be returned if they are the same.

Radyne Private MIB for RCS10

Add to the end of line:

RadRCS10_TxConvolutionalEncoder OBJECT-TYPE
SYNTAX Integer {
Comstream_seq_3_4(19)

,
tpc793_2D(20),
tpc495_3D(21),
tpc325_3D(22)

Add to the end of line:

DESCRIPTION
"Selects…

…for future use. Sequential, turbo codec, and trellis are installed options."

Delete from line:

RadRCS10_TxModulationType OBJECT-TYPE
DESCRIPTION
"Selects…

16QAM modulation is not yet implemented.

Add to the end of line:

RadRCS10_RxConvolutionalDecoder OBJECT-TYPE
SYNTAX Integer {
Comstream_seq_3_4(19)

,
tpc793_2D(20),

tpc495_3D(21),

tpc325_3D(22)

Add to the end of line:

DESCRIPTION

"Selects…

…for future use. Sequential, turbo codec, and trellis are installed options."

Replace the following line:

RadRCS10_RxAlarm5Mask OBJECT-TYPE

SYNTAX Integer…

Bit 1..7 = Spares

With:

Bit 1 = FMDSP Lock

Bit 2 = T1 signaling fault

Bit 3 = Turbo codec lock fault

Bits 4 – 7 = Spares

Insert after the following line:

RadRCS10_RxAlarm5Status OBJECT-TYPE

DESCRIPTION

Bit 0 = Trellis decoder lock

With:

Bit 1 = FMDSP Lock

Bit 2 = T1 signaling fault

Bit 3 = Turbo codec lock fault

Change the following line:

RadRCS10_RxAlarm5Status OBJECT-TYPE

DESCRIPTION

Bits 1 – 7 = Spares

To:

Bits 4 – 7 = Spares

Turning On/Off the Fairchild Compatible Scrambler/Descrambler

For the Mod

5. Go to the ‘Mod Confg’ Screen
6. Press the ‘Next’ Key 4 times.
7. ‘Type’ will appear. Press ‘More’ until you see ‘V.35 (FC)’.
8. Press ‘On’ or ‘Off’ as applicable.

For the Demod

5. Go to the ‘Demod Confg’ Screen
6. Press the ‘Next’ Key 5 times.
7. ‘Type’ will appear. Press ‘More’ until you see ‘V.35 (FC)’.
8. Press ‘On’ or ‘Off’ as applicable.

Swapping the Symbol for BPSK

For the Mod

2. Go to the ‘Mod Confg’ Screen

2. Press the ‘Next’ Key 7 times.
3. ‘Pairing’ will appear. Press ‘Swapped’ or ‘Normal’ as applicable.

For the Demod

1. Go to the ‘Demod Confg’ Screen

2. Press the ‘Next’ Key 8 times.

3. ‘Pairing’ will appear. Press ‘Swapped’ or ‘Normal’ as applicable.

Storing and Recalling 5 Configurations

1. From “Interface”, go to the ‘Confg’. The ‘Modem Configuration Copy’ Screen (Refer to Figure 1) will appear.

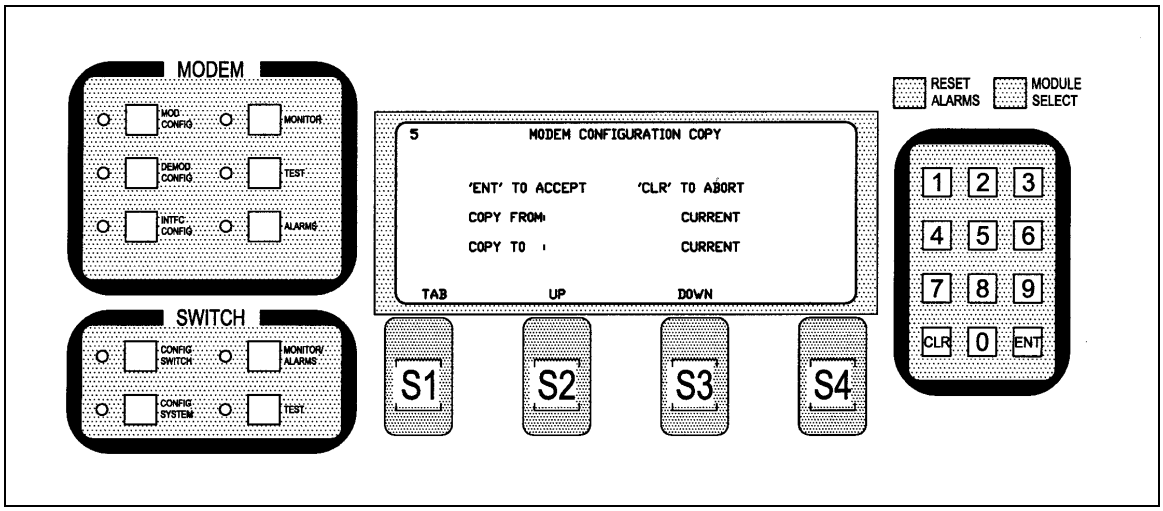


Figure 1.

2. Press the ‘Tab’ Button to select between ‘Copy from:’ and ‘Copy to:’.

3. Press the ‘Up’ or ’Down’ Buttons to select ‘Confg1‘ - ‘Confg5’ (the five configurations).

DMD10 I & Q Ports *(Refer to Figures 2 and 3)*

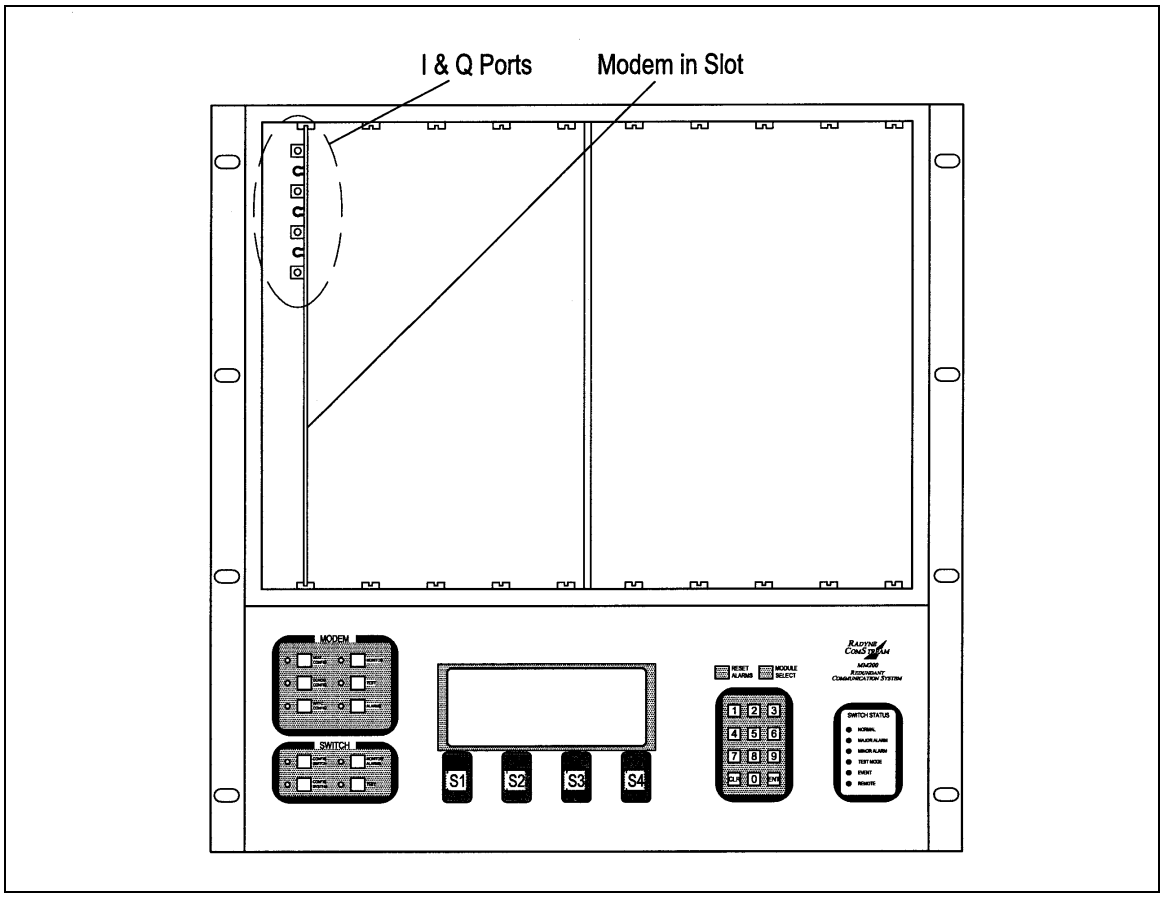


Figure 2.

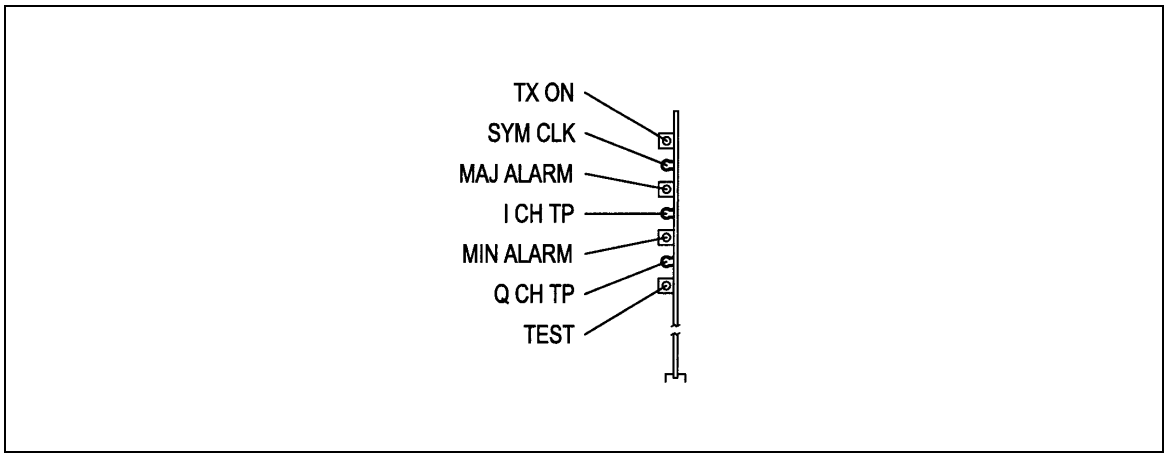


Figure 3.